Patient and Provider Perspectives on Glaucoma Treatment Adherence: A Delphi Study in Urban Alabama

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SIGNIFICANCE: Patients with glaucoma and providers recognized perceived treatment efficacy, patient-provider relationship, psychological stress, instillation skill, good quality of life, and forgetfulness as key determinants of glaucoma adherence. This shared insight could help shape the development of clinical and behavioral interventions for addressing treatment barriers and improving adherence.

PURPOSE: Despite their impact on adherence in glaucoma, sociobehavioral factors may not be adequately explored during clinical consultations. We aimed to elicit consensus between patients and providers around key determinants of adherence and hypothesized that patients would place greater emphasis on sociobehavioral factors compared with providers.

METHODS: A two-round Delphi survey was used to assess treatment beliefs, barriers, facilitators, motivators, and needs among 18 patients with glaucoma and providers. In round 1, agreement with 46 statements was scored on a 5-point Likert scale (strongly disagree to strongly agree). Statements with which 80% or more of panelists agreed reached consensus and advanced to round 2, where participants were asked to prioritize them based on their importance to treatment.

RESULTS: There was consensus regarding the influence of perceived treatment efficacy, good provider relationship, good quality of life, psychological stress, glaucoma knowledge, instillation skill, and forgetfulness on glaucoma adherence. For statements that failed to reach consensus, the Bonferroni-corrected Mann-Whitney U test revealed that the greatest differences between patients and providers pertained to regimen complexity (provider median, 4 [interquartile range {IQR}, 1]; patient median, 1.5 [IQR, 1]; $P = .002$), instillation skill (providers, 4 [IQR, 0.5]; patients, 2 [IQR, 1]; $P = .001$), and low motivation (providers, 3 [IQR, 2.25]; patients, 1 [IQR, 0]; $P = .003$).

CONCLUSIONS: Although patients and providers prioritized sociobehavioral factors as key determinants of adherence, disagreement between these groups was observed in other areas. Continued juxtaposition of patient and provider perspectives could spotlight underexplored areas and guide the development of successful interventions for improving adherence.

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More than 60 million people worldwide are affected by primary open-angle glaucoma,[1–3] a progressive optic neuropathy characterized by retinal ganglion cell death and distinctive patterns of vision loss. Although daunting, this figure is likely to be an underestimation, as only half of all persons living with glaucoma are believed to be diagnosed.[4] Glaucoma is a leading cause of irreversible blindness in the United States,[2,5] and eye drops that lower intraocular pressure (IOP) and delay glaucomatous progression accounted for more than 50% of Medicare part D prescribing costs in 2013.[6] Despite extensive prescribing, the proportion of patients with good adherence to recommended therapy is reported to be as low as 20%.[7] Although later studies have reported higher rates,[8–10] adherence in glaucoma remains suboptimal. High treatment cost, low education level, forgetfulness, and regimen complexity have been identified

as key sociodemographic and clinical determinants of poor adherence.[11] However, many interventions based on these variables have demonstrated variable degrees of success, suggesting the possible influence of social, psychological, and behavioral factors on adherence to glaucoma therapy.

Sociobehavioral factors such as poor patient-provider relationship,[12] low self-efficacy,[13] and psychological stress[14] have been found to affect adherence in glaucoma. A study in diabetes also reported that patients were intentionally nonadherent in social settings because of embarrassment and public perception.[15] Despite their influence, providers may have a limited ability to address sociobehavioral factors because of disparate perspectives and experiences relative to patients.[16] A 2005 study reported that poor communication between patients and providers led to nearly one in five patients using the

wrong regimen.[17] It is vital that patients and providers improve their understanding of each other, as this is the basis for shared decision making and effective treatment. We aimed to elicit consensus between patients and providers around key determinants of adherence using Delphi surveys. We used a mixed-methods approach to assess treatment perspectives and hypothesized that patients would place a greater emphasis on sociobehavioral factors compared with providers.

METHODS

Participant Selection and Recruitment

This research was reviewed by an independent ethical review board and conforms with the principles and applicable guidelines for the protection of human subjects in biomedical research. In addition, all research adhered to the Health Insurance Portability and Accountability Act, as well as the tenets of the Declaration of Helsinki. Optometrists and ophthalmologists with at least 2 years of experience treating glaucoma, and patients diagnosed with primary open-angle glaucoma for at least 2 years were recruited to participate in the Delphi survey. Patients also had to be older than 40 years, have best-corrected visual acuity better than 20/40, have been using hypotensive eye drops for at least 3 months, and have at least two reliable visual field tests (false positive rates <33% and fixation loss rates <20%). Providers were recruited from Callahan Eye Hospital and Clinics (CEHC), the University of Alabama at Birmingham School of Optometry Eye Care Clinic, and community-based practices within Jefferson County. All patients were recruited from CEHC. Visual field tests were obtained from patients' clinical charts and used to determine disease severity. Based on perimetric research, we accepted visual field tests taken within 6, 12, and 24 months of study commencement for patients with severe, moderate, and mild glaucoma, respectively.[18–20] Regardless of disease severity, 90% of patients underwent visual field testing within 12 months of study commencement. Disease severity was ascertained according to the Hodapp-Parrish-Anderson criteria.[21]

Delphi Survey Methodology

Delphi surveys use iterative rounds of questionnaires to refine consensus around a topic of interest among diverse respondents. These respondents—referred to as panelists—may represent one or more professional groups. In our study, we used two professional groups: patients with glaucoma and glaucoma eye care providers. In Delphi surveys, panelists complete questionnaires in each round, and items that reach high levels of agreement (consensus) are identified. Responses are summarized, and items that fail to reach consensus are excluded from successive rounds of questionnaires.[22] In this way, expert consensus on a specific topic is continuously refined. Delphi surveys lack the limitations of other qualitative methods such as focus groups, which provide rich qualitative data but afford little anonymity. An additional advantage of Delphi surveys is their allowance for meaningful findings using relatively few participants. Sample size determination in Delphi surveys, unlike studies that use inferential statistics, is motivated by the need to maximize the generation of ideas while minimizing cost and procedural inefficiencies. Panels with 15 to 25 members are both common and empirically sound in health care research.[23] We determined the sample size for our study by referring to Delphi literature recommending 10 to 50 panelists.[24] We determined the size of our patient groups (n = 10) and provider groups (n = 8) by following recommendations that advise 5 to 10 panelists per professional group.[25] We used the modified, two-round Delphi survey, which is appropriate when substantial primary literature exists on the topic under study.[22]

We used purposive, nonrandom sampling, which in Delphi studies is primarily based on panelist expertise and experience in the research area.[26–28] Consequently, Delphi panels may, by design, be unrepresentative of the larger population to ensure that panelists have expertise and experience relevant to the topic being investigated. To maximize the expertise of our panel, we oversampled for patients more likely to have difficulty maintaining good adherence, racial and ethnic minorities, patients with severe glaucoma, patients with glaucoma for more than 2 years, and patients with complex regimens. Provider panelists were selected from various backgrounds (e.g., ophthalmology, optometry, tertiary referral centers, and community-based clinics). Recruitment letters were mailed to eligible participants and followed up with up to three phone calls.

Round 1 Data Collection

Before study commencement, the interviewer (SP) was trained in qualitative data collection by completing instructional modules from the University of Minnesota[29] and the University of Kansas,[30] and later completed three trial interviews under the supervision of study personnel. Modules covered recommendations for conducting focus groups, in-person and telephone interviews, guidance on note-taking and recording during interviews, recommendations for transcribing and reporting qualitative research findings, and guidelines for minimizing bias. In round 1, participants completed the National Eye Institute Visual Function Questionnaire 25,[31] demographic questions, and a semistructured Health Belief Model (HBM)–based questionnaire exploring several dimensions of glaucoma treatment. The HBM predicts the likelihood of a given health behavior by factoring in modifying variables called constructs.[32] Documented determinants of adherence were identified via literature review and mapped onto the HBM constructs they addressed. Five groups of determinants reflecting five HBM constructs were identified: treatment beliefs, treatment barriers, treatment motivators (perceived benefits of treatment), and treatment facilitators (thoughts and actions that lead to desired behavior). The final group constituted treatment needs, which despite being recognized in glaucoma literature, are not included in the HBM. Statements addressing identified determinants were developed, and face validity of each statement was assessed by a panel of optometrists and social scientists.

Participants' level of agreement with each questionnaire statement was scored on a 5-point Likert scale (strongly disagree to strongly agree), and wording for patient and provider questionnaires was adjusted to reflect their respective perspectives. For instance, providers were asked "Do you think that the medication you prescribe is effective?" whereas patients were asked "Do you believe that the medication prescribed by your doctor is effective?" In addition to Likert scale–based responses, panelists were encouraged to provide additional context, which was audio recorded with participants' consent to allow for transcription. The National Eye Institute Visual Function Questionnaire 25 was excluded from provider questionnaires because only patients' clinical characteristics were of interest. Patient questionnaires were administered by the interviewer in private rooms at CEHC, whereas provider questionnaires were administered at CEHC (n = 2) or their practice (n = 6). All data were collected from September 2019 to November 2019 (Appendix Table A1, available at http://links.lww.com/OPX/A520).

TABLE 1. Clinical and demographic characteristics of patient and provider panelists

Study variables	
Patients (n = 10)	
Acuity (logMAR), mean (SD)	0.24 (0.14)
IOP (mmHg), OD, mean (SD)	14.5 (3.7)
IOP (mmHg), OS, mean (SD)	14.5 (4.6)
General health score, median (IQR)	50 (0)
General vision score, median (IQR)	37.5 (25)
Mental health score, median (IQR)	46.9 (51.6)
Glaucoma severity, n (%)	
Mild	2 (20)
Moderate	3 (30)
Severe	5 (50)
No. comorbidities, n (%)	
0	1 (10)
1–2	2 (20)
3–4	5 (50)
≥5	2 (20)
Comorbidities (%)	
Diabetes	3 (30)
Hypertension	7 (70)
High cholesterol	3 (30)
GERD	4 (40)
Depression	4 (40)
Medication type (%)	
Prostaglandin analogs	50
β-Blockers	21.43
Carbonic anhydrase inhibitors	21.43
α-Agonists	7
Sex, n (%)	
Male	4 (40)
Female	6 (60)
Age, n (%)	
50–59 y	4 (40)
60–69 y	4 (40)
70–79 y	2 (20)
Race, n (%)	
African descent	7 (70)
European descent	2 (20)
Multiracial (European and Native American)	1 (10)
Ethnicity, n (%)	
Hispanic	1 (10)
Income level, n (%)	
<$10,0000	1 (10)
$10,000–$59,000	6 (60)
$60,000–$100,000	1 (10)

TABLE 1. *Continued*

Study variables	
$100,000–$149,000	1 (10)
>$150,000	1 (10)
Education level, n (%)	
Some high school	1 (10)
Some college	6 (60)
Bachelor's degree	2 (20)
Graduate or professional degree	1 (10)
Employment level, n (%)	
Unemployed/unable to work	1 (10)
Employed full-time	3 (30)
Retired	6 (60)
Providers (n = 8)	
Sex, n (%)	
Male	3 (37.5)
Female	5 (62.5)
Age, n (%)	
30–39 y	2 (25)
40–49 y	3 (37.5)
50–59 y	2 (25)
60–69 y	1 (12.5)
Race, n (%)	
African descent	2 (25)
Asian descent	1 (12.5)
European descent	5 (62.5)
Specialty type, n (%)	
Optometrists	5 (62.5)
Ophthalmologists (specialists and surgeons)	3 (37.5)
Weekly patient load, n (%)	
25–50	5 (62.5)
50–75	1 (12.5)
75–100	1 (12.5)
100–125	1 (12.5)
Method for assessing adherence, n (%)	
Self-report	6 (75)
Self-report and prescription records	2 (25)

GERD = gastroesophageal reflux disease; IQR = interquartile range; SD = standard deviation.

Round 1 Analysis

Likert responses were recoded so that 1 indicated strongly disagree; 2, disagree; 3, neutral; 4, agree; and 5, strongly agree. IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY)[33] was used to perform Bonferroni-corrected Mann-Whitney *U* tests for significant differences between patient and provider responses. Neutral scores (3) were then omitted for each statement, and remaining scores were dichotomized into two response types: agreement (4 or 5) or disagreement (1 or 2). Disagreement

was indicated by negative values, whereas agreement was indicated by positive values. For example, a statement receiving scores of 4 and 5 from 9 of 18 panelists had an agreement level of 50%, whereas a statement receiving scores of 1 and 2 from 9 of 18 panelists had an agreement level of −50%. Consensus was defined as an agreement level of 80% or more, and all statements reaching consensus advanced to round 2. This threshold was selected because it was the most conservative threshold reported in similarly sized Delphi studies.[34]

After quantitative analysis was complete, audio recordings of the questionnaire sessions were transcribed, and qualitative analysis was performed in Nvivo Version 12 (QSR International, Victoria, Australia).[35] A codebook was developed by two researchers (SLA, SP) during the preliminary review of the transcripts, and codes were assigned to the transcribed text based on content.[36] Per each code, verbal responses were sorted into two groups: confirmatory (+), where panelists agreed that the factors being discussed impacted adherence, and contradictory (−), where panelists disagreed. A coding comparison between the two researchers was performed, and Cohen κ statistic was used to assess intercoder reliability.

Round 2 Data Collection and Analysis

Once round 1 data were analyzed, post-round reports containing individual questionnaire scores and median scores for the entire panel were mailed to all panelists, who were also invited to review the reports and revise their round 1 responses if desired. No panelists amended their responses after reviewing round 1 reports. In round 2, panelists were asked to prioritize the statements that reached consensus in round 1 based on their importance to glaucoma treatment. Round 2 was conducted from December 2019 to February 2020, and post-round reports were issued to panelists after analysis. No panelists were lost to attrition, and we had a 100% response rate in both Delphi rounds.

RESULTS

Demographic and Clinical Characteristics

Table 1 shows the clinical and demographic characteristics of Delphi panelists. Fifty percent of patient panelists had severe glaucoma (mean deviation worse than −12 dB), whereas 70% of patients were diagnosed with three or more chronic health conditions, the most common of which were hypertension, depression, gastroesophageal reflux disease, and diabetes. Persons of African descent constituted the largest racial group among patients (70%), followed by persons of European descent (30%). Among providers, persons of European descent constituted the largest racial group (62.5%), followed by persons of African descent (25%) and persons of Asian descent (12.5%). Men constituted 40% of patients compared with 37.5% of providers. All patients were between the ages of 50 and 70 years, compared with only 37.5% of providers.

Statements Failing to Reach Consensus

Of the 36 statements that failed to reach consensus, 19 showed opposing responses (one group agreed, whereas the other disagreed). These data are shown in Fig. 1. One statement was excluded from analysis because patient scores were evenly dichotomized into agreement and disagreement, and a majority response type could not be determined ("Reminders and alarms are helpful"). This reduced the number of statements to 46. Relative to providers, patients

agreed that they could manage glaucoma without instrumental help (assistance with physical tasks such as clinic visits and instilling drops). However, patients disagreed that they could manage glaucoma without emotional support or that they could easily detect changes in their vision over time (Fig. 1A). Among treatment barriers, patients disagreed with providers that any barriers except for busy schedule negatively affected adherence (Fig. 1B). Bonferroni-corrected Mann-Whitney U tests revealed significant differences between patients and providers regarding the influence of regimen complexity (provider median, 4 [interquartile range {IQR}, 1]; patient median, 1.5 [IQR, 1]; $P = .002$), poor instillation skill (providers, 4 [IQR, 0.5]; patients, 2 [IQR, 1], $P = .001$), low motivation (providers, 3 [IQR, 2.25]; patients, 1 [IQR, 0]; $P = .003$), medication cost (providers, 5 [IQR, 3]; patients, 2 [IQR, 0]; $P = .002$), and transportation (providers, 3 [IQR, 2.25]; patients, 1 [IQR, 0]; $P = .001$). Patients agreed with providers that all facilitators except for making schedules positively impacted adherence (Fig. 1C) and disagreed with providers that help was needed with transportation or paying for treatment (Fig. 1D).

Statements Reaching Consensus

Fig. 2 depicts the agreement levels for statements that reached consensus and advanced to round 2. In round 2, perceived treatment efficacy ("Prescribed medication is effective," "Not using eyedrops affects vision") was prioritized as the most impactful treatment-related belief, followed by good patient-provider relationship ("I can openly discuss problems with my doctor") and adequate glaucoma knowledge ("I have a good understanding of glaucoma"). Also in round 2, reducing worry about blindness was prioritized as the strongest motivator for good adherence, followed by being independent, being able to navigate freely, and being able to drive. Memory aides were identified as the most pressing treatment need, followed by guides for instilling drops.

Qualitative Analysis

Results of our thematic analysis are presented in Table 2. For patients, prominent themes were related to good quality of life (13 comments), psychological stress (10 comments), and glaucoma knowledge (9 comments). Among providers, patient-provider relationship (40 comments), glaucoma knowledge (29 comments), and quality of life (16 comments) were the most recurrent themes. Cohen κ was calculated to be 0.62 indicating good interrater reliability.[35]

DISCUSSION

Although several studies have explored patient perspectives in glaucoma, a smaller proportion have comparatively assessed patient and provider perspectives.[10,14,37] Our study revealed consensus regarding the impact of perceived treatment efficacy, patient-provider relationship, forgetfulness, psychological stress, installation skill, wanting a good quality of life, and glaucoma knowledge. Among these, perceived treatment efficacy, reduced psychological stress, and memory aides were the most highly prioritized treatment beliefs, treatment motivators, and treatment needs, respectively. Although both panelist groups identified determinants of socioeconomic and sociobehavioral origin, providers tended to recognize socioeconomic treatment barriers such as cost and transportation. Patients tended to recognize sociobehavioral
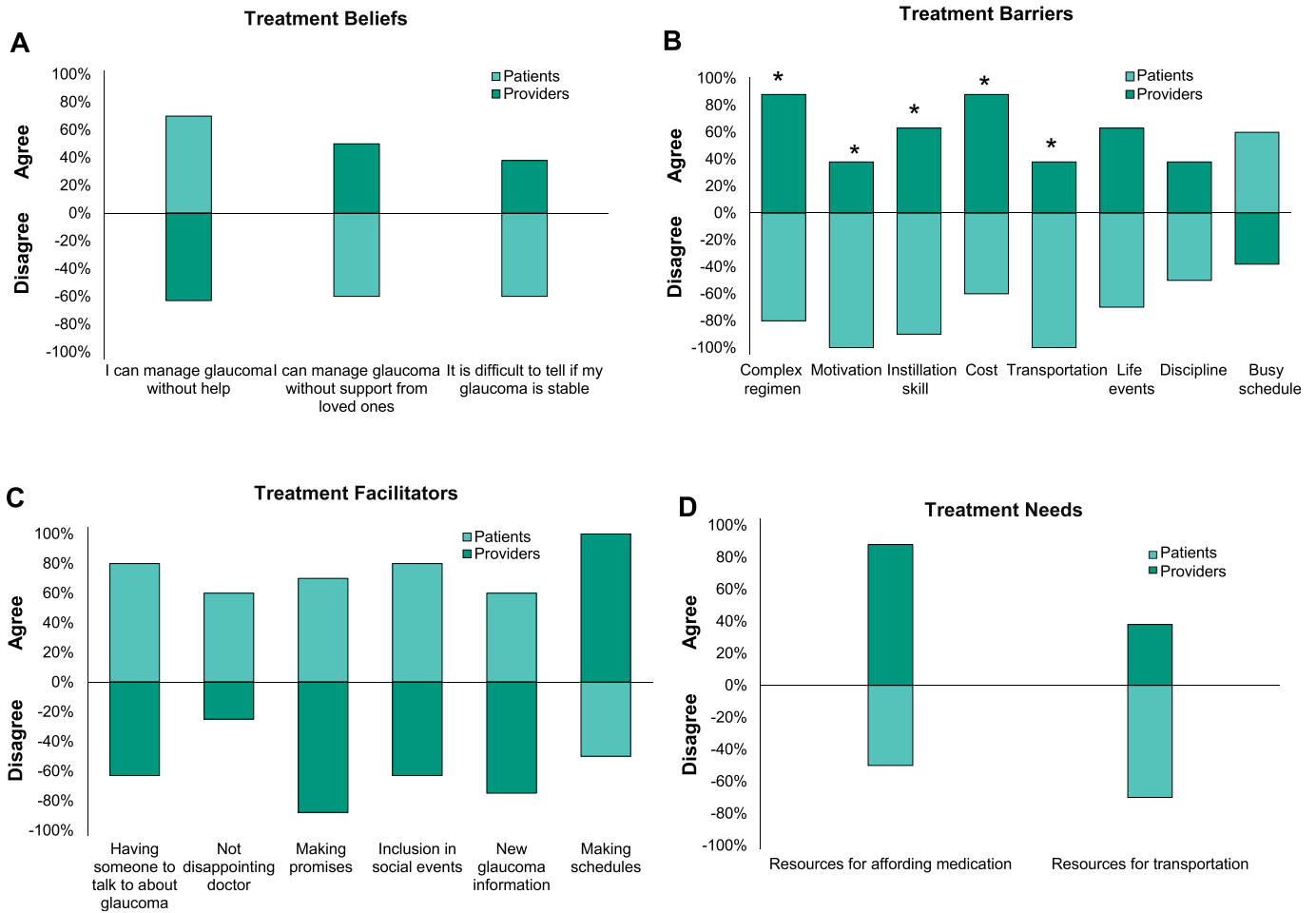
FIGURE 1. Majority response types and agreement levels for statements that did not reach consensus. Three treatment beliefs (A), eight treatment barriers (B), six treatment motivators (C), and two treatment needs (D) failed to reach consensus and showed opposing responses among patients and providers (n = 18). Consensus refers to an 80% or more overall agreement. Negative values indicate disagreement with statements, whereas positive values indicate agreement. *Statistically significant differences between patient and provider responses detected by the Bonferroni-corrected Mann-Whitney *U* test.

treatment facilitators such as social support and close patient-provider relationships.

Other prominent differences between patients and providers pertained to the importance of day-to-day support. Relative to providers, patients minimized instrumental support while prioritizing emotional support, suggesting a need for greater emphasis on patients' level of social and emotional wellness. Social support is also closely related to good quality of life,[38,39] another factor that reached consensus. Both patient and provider panelists recognized the importance of being able to navigate freely, drive, and remain independent, as well as the threat that glaucoma posed to the continuation of these activities. The patient-provider relationship was also spotlighted; patients agreed that not wanting to disappoint their doctor influenced their adherence behavior, whereas providers disagreed. Because many clinicians rely on patient-reported adherence, patient overestimation due to provider expectations could skew an assessment and misinform treatment decisions.[40] Some providers commented that provider expectations were barriers to honest communication, whereas others considered them to be facilitators of good adherence if properly leveraged. One patient admitted

to deliberately skipping clinic visits during periods of poor compliance because they believed that their doctor would know.

Despite differences in perspectives, several factors reported to be important in adherence literature reached consensus in this study. Both panelist groups recognized the impact of psychological stress, a finding consistent with research indicating that patients with glaucoma are up to 12 times more likely to experience depression than persons without glaucoma.[41] In response to such findings, there have been increasing appeals for the adoption of interventions that manage the negative effect associated with glaucoma diagnosis.[42] Panelists also expressed a need for eye-drop installation guides. Poor installation skill has been identified as a treatment barrier,[43–45] with as few as 10% of patients correctly instilling eye drops.[46] This is concerning because poor installation may result in poor IOP control and increased treatment costs, as well as poor treatment efficacy, which was another factor that reached consensus. Unlike many chronic conditions, glaucoma has no overt symptoms that prompt patients to maintain good adherence. This suggests that positive perceptions about the effectiveness of treatment are strong determinants of adherence, as evinced by the continued
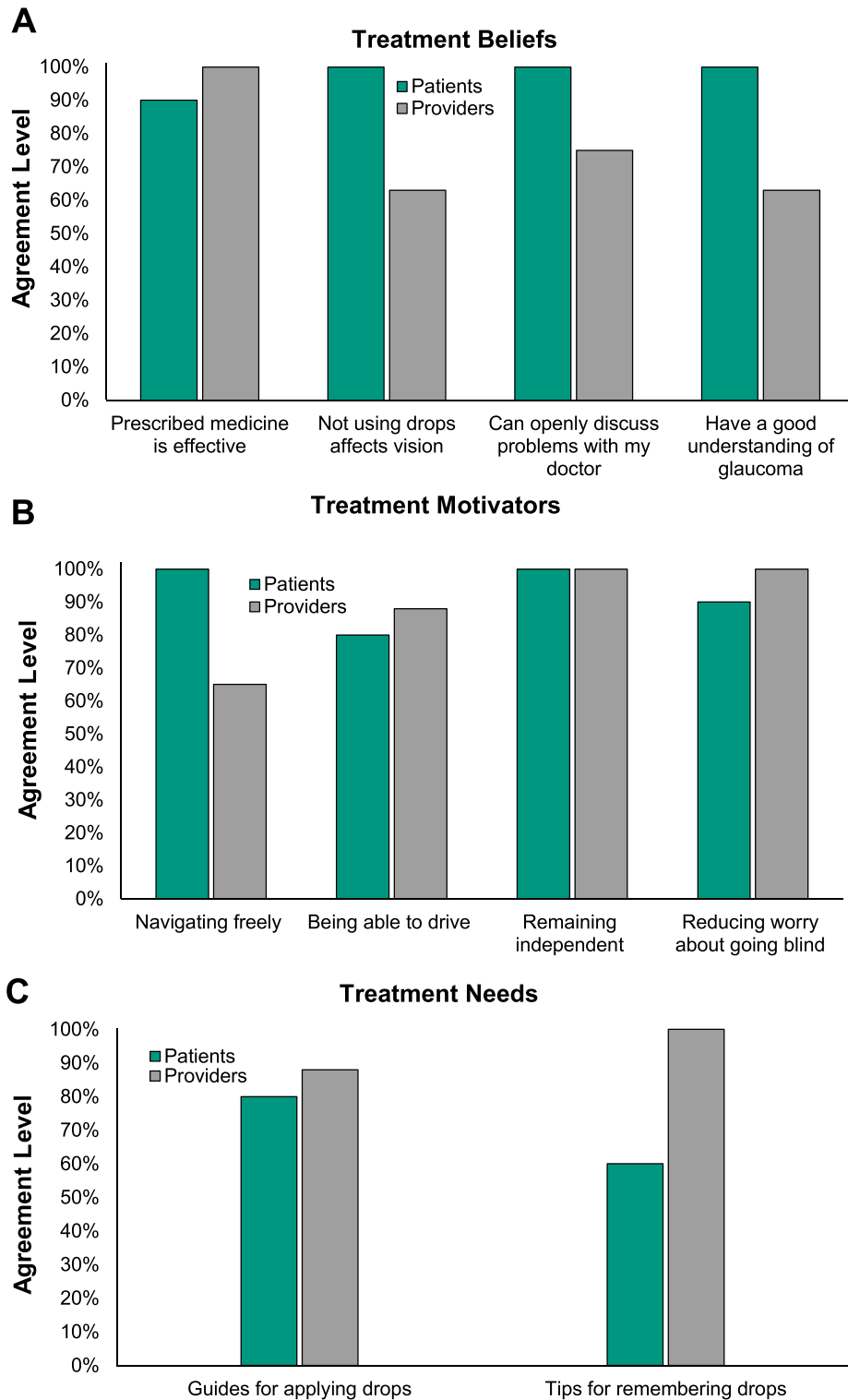
A

Treatment Beliefs

B

Treatment Motivators

C

Treatment Needs

FIGURE 2. Agreement levels for statements that reached consensus. Four treatment beliefs (A), four treatment motivators (B), and two treatment needs (C) reached consensus in round 1. Consensus refers to an 80% or more agreement. No statistically significant differences between patients and providers (n = 18) were detected by the Bonferroni-corrected Mann-Whitney *U* test.

use of IOP-lowering drops among patients, even when there is no immediate perceived benefit.[47] Providers stated that they reinforced treatment efficacy with a variety of techniques such as simulations of progression.

Other notable themes included patient motivation and the irreversible nature of glaucoma. Because therapy delays progression rather than restoring vision, patients may experience dampened treatment expectations and lower motivation. In recent years,

TABLE 2. Major themes emerging from content analysis

Themes	Patients			Providers		
	Sample quote	(+)	(−)	Sample quote	(+)	(−)
Health system, provider relationship	"I do not want to disappoint my doctor because I'm the patient that really does what they say, and they know"	2	2	"Patients want to please the physicians. If they think the physician will be disappointed if they say I'm not taking my drops"	39	1
Treatment cost	"This one we had to get for surgery prep was expensive"	4	2	"Cost of eye drops, that's a big deal"	8	0
Social/emotional support	"I only talk to my daughter about this"	3	1	"Especially for moderate-severe or those having surgery"	10	0
Psychological stress (worry, fear, anxiety)	"I'm embarrassed because other people can read along with subtitles and I cannot even get to it"	7	3	"They become frustrated by that and you must keep reminding them that the goal is to prevent loss of vision not to get more"	11	6
Instrumental support	"I cannot drive or do any of those things, I need help"	3	1	"I would say that most need some type of support system"	14	0
Medication side effects	"The taste, just the taste"	2	1	"Even if effective, it may not be used because of burning, stinging"	6	2
Transportation	"I will have to disagree with that since I cannot drive or do any of those things"	1	1	"Lack of reliable transportation—I've had a lot of no shows—IOP check, things like that"	7	1
Instillation skill and dexterity	"I remember when it was the child top, but now you have to squeeze and line this up."	2	0	"It's got to be 90 percent of patients who would need help with this"	11	1
Glaucoma knowledge and health literacy	"Yes, I teach anatomy and I take the eyes apart in class"	7	2	"We give patients a ton of information and a lot is lost as soon as they hear the diagnosis"	26	3
Treatment efficacy	"I understand if I do not take my medicine, I will be blind"	6	1	"Sometimes it's hard to really tell if it's working"	7	3
Life events and busy schedules	"I take care of people; I take care of my husband"	3	0	"It's just hard when they are on vacation"	4	1
Comorbidities and complex regimens	"I take so much medicine. The drops are the last thing I do at the end of the day"	1	0	"The problem is that there is a balance. After 2, 3 medications, compliance just falls"	11	0
Forgetfulness and reminders	"They gonna call to remind me so I do not even keep up"	4	3	"Reminders, if patients are able to, are incredibly helpful."	14	0
Self-efficacy	"I might miss some here and there"	1	0	"Many of them do need help"	5	0
Motivation	—	0	0	"Motivation is there, but it can wax and wane"	3	1
Quality of life	"It took me from being independent to being dependent again."	11	2	"Patients want to be independent. If the VF gets tiny and central vision is affected, they will not be"	15	1
Surgical treatment (fear or complications)	"He has to pause from regular medication after surgery, but he is on another one"	1	0	"I'll see people that are teetering on surgery or not. I'll say let us just give it one more month, then they'll come clean"	5	0

Positive signs (+) indicate confirmatory statements where panelists agreed that themes affected adherence. Negative signs (−) indicate contradictory statements where panelists disagreed that themes affected adherence.

motivational interviewing has become a common strategy for resolving patient ambivalence and has demonstrated favorable results.[48] Patients also communicated high levels of openness with providers. Research has shown that communication styles and clinical priorities vary across ethnicity, race, and culture[49] and that their incorporation into clinical decision making is associated with improved outcomes.[50] However, such findings stand in contrast with glaucoma research indicating that patients' views and treatment goals may not be adequately explored.[51] Our results highlight the need for providers to remain vigilant for sociobehavioral determinants, particularly because less observable factors such as acute psychological stress have been associated with elevated IOP.[52]

In addressing the underrepresentation of complementary patient and provider perspectives in glaucoma literature, this study revealed areas of consensus regarding the impact of perceived treatment efficacy, provider relationship, psychological stress, glaucoma knowledge, wanting a good quality of life, instillation skill, and forgetfulness. Qualitative analysis revealed the patient-provider relationship to be the most discussed theme, and we believe that it is one of the most proximal and direct determinants of good adherence. Strengths of this study include qualitative analysis, which supported our findings,[53] and panelists' diverse clinical and demographic backgrounds, which provided nuanced perspectives. Although unaware, several patients and their personal providers participated in the study. This imparted an added layer of granularity to the study, as these paired responses directly measured differences and similarities in perspectives. Other strengths include use of an established health model in the development of questionnaires and

the issuance of post-round reports that afforded patient panelists the opportunity to appreciate research findings.

This study is not without limitations, however. The relatively small panel size may limit the generalizability of our findings, as providers' responses were based on experiences with multiple patients, whereas patients' responses were based on experience with a single provider and their unique clinical history. Lastly, all participants were aware that the Delphi panel comprised both patients and providers and that both groups would receive post-round reports. Despite the data being deidentified, this knowledge could have contributed to responder bias.

To our knowledge, this is the first study to comparatively assess treatment perspectives among patients with glaucoma and providers using both qualitative and quantitative methods. Our hypothesis was partially supported, as both groups prioritized sociobehavioral factors as key treatment beliefs, barriers, motivators, facilitators, and needs. However, per Delphi studies, the external validity of our findings lies in whether they are substantiated in real-world situations. Continued juxtaposition of patient and provider perspectives could spotlight other underexplored areas and inform the development of successful interventions for improving treatment adherence in glaucoma.

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