

Referral to Low Vision Services for Glaucoma Patients: Referral Patterns and Characteristics of Those Who Refer

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Purpose: To identify characteristics of ophthalmologists and practices who refer glaucoma patients to low vision services (LVS).

Materials and Methods: An online survey was distributed to members of the American Glaucoma Society. The survey queried demographics of responders and their clinical practices, criteria and barriers to referral to LVS. Survey responders were categorized as high referrers if they reported referring > 5 patients to LVS and low referrers if they referred ≤ 5. χ^2 and Fischer exact tests were used to compare characteristics between high and low referrers. Logistic regression analyses were used to calculate odds ratios and 95% confidence intervals and determine factors associated with referrer status.

Results: High referrers to LVS tended to have > 10 patients per month who had already seen a low vision provider (53% vs. 10%, $P < 0.001$), reported following the American Academy of Ophthalmology's Preferred Practice Pattern (PPP) recommendations for LVS referrals (38% vs. 18%, $P = 0.011$), and expressed satisfaction with their current referral practices (86% vs. 70%, $P = 0.049$). In the fully adjusted model those who followed PPP were 2.5 times more likely to report being a high referrer as compared with a low referrer (95% confidence interval, 1.1-5.3). However, only 22% of ophthalmologists reported following these guidelines in their practice. The number of years in practice, practice location or type, volume of patients seen each week, and distance to a low vision clinic were not associated with referral.

Conclusions: Familiarity with PPP guidelines may positively influence LVS referral practices.

Key Words: glaucoma, low vision services, vision rehabilitation

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There are 2.4 million Americans with low vision. This estimate is projected to increase to 3.9 million, or 2.5% of the population by the year 2020.¹ Glaucoma is the leading cause of irreversible visual impairment worldwide and as the aging population grows, the expected number of

those with glaucoma, and consequently low vision, will increase.² This poses a major public health concern as people with low vision tend to find it more difficult to perform activities of daily living, are at greater risk for injury, and suffer higher rates of depression.³⁻⁶ Low vision rehabilitation is designed to increase functional ability and improve quality of life by addressing the challenges imposed by visual limitations. For example, low vision services (LVS) assist individuals with reading-related activities and mobility, and work to increase social interaction, independence, and emotional well-being.^{7,8} Improvements in these basic activities have a positive impact on overall quality of life.^{7,8} Timely and appropriate delivery of LVS is important as the burden of disability related to vision-related morbidity is significant.⁷⁻¹¹

Despite the large number of patients who could benefit from LVS, rates of uptake are low, with only 5% to 10% of those with low vision enrolling in these services.¹² The reasons for not accessing low vision care are complex. According to patient reports, these include not understanding what low vision is, being unaware of what services are available or how they may benefit, miscommunication between patients and eye care providers, lack of referral, inconvenient location of rehabilitation centers or lack of transportation, associated comorbidities that limit mobility, fear of judgment by society, education level, and cost.¹³⁻¹⁵ Across the literature, the most common reasons for potential underutilization are related to lack of referral or miscommunication between patients and providers on the benefits of LVS. In a study by Spafford et al,¹⁶ 64.7% of patients who qualified for low vision cited a lack of communication between them and their eye care provider as the explanation for not attending LVS. In an Australian study, 85% of patients stated that having a referral or being given information on LVS facilitated the decision to attend.¹⁷

Although glaucoma is a leading cause of irreversible visual impairment, low vision centers are largely populated by patients with age-related macular degeneration (AMD) and diabetic retinopathy (DR).¹⁸⁻²¹ In a study by Owsley et al²⁰ on characteristics of LVS in the United States, it was reported that 67.1% of those enrolled had AMD, whereas only 13.9% of patients had glaucoma. The reasons for potential underutilization of LVS by glaucoma patients is not well understood, and unlikely due to absence of functional loss, as glaucoma patients have functional complaints affecting their activities of daily living.²² The responsibility of referral tends to fall largely on ophthalmologists.^{14,23} The role of the ophthalmologist in the referral process is crucial, as 48% of referrals come from ophthalmologists, whereas only 11.4% are from optometrists, and 17% by other health care providers.²⁰

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The aim of this study is to determine, from the perspective of glaucoma specialists, the criteria used for LVS referral and to describe the characteristics of glaucoma specialists who are high and low referrers to LVS.

MATERIALS AND METHODS

Study Design

A survey assessing LVS referral practices was sent to glaucoma specialists through email or postal mail. Institutional Review Board approval at the University of Maryland was obtained before the collection of any data. The survey was posted online using the SurveyMonkey Web site and a link was created to facilitate distribution. The web link was sent out in an email over the list server of the American Glaucoma Society (AGS). Three sets of emails were sent out to the group. A letter with the web link was also sent out to each member of the AGS. Participation in the study was anonymous. Respondents were asked at the beginning of the survey whether or not they were ophthalmologists involved in the care of glaucoma patients. If they answered yes, they were allowed to proceed with the survey. If they answered no, the survey terminated. The survey remained open for 4 months, from February 10, 2015 to June 10, 2015.

The survey consisted of 30 questions divided into 5 sections. The first and second sections sought to identify practitioner demographics and characteristics of their patient population. Criteria for referral were addressed in section 3. Section 4 asked respondents about their previous training and familiarity with LVS. In section 5 respondents answered questions about perceived barriers to referral practices (see appendix, Supplemental Digital Content 1, <http://links.lww.com/IJG/A98> for a copy of the questionnaire).

Participants

Participants in the study were all members of the AGS. Membership to the society is through a formal approval process and is described on their Web site (http://www.americanglaucomasociety.net/professionals/become_a_member/requirements). There are 1128 members who have access to the email list server on which the survey was posted. Of these, 1029 are eligible to complete the survey based on their membership status. Members were ineligible to complete the survey if they were nonphysicians (Associate member) or retired (Emeritus member).

Analysis

The number and percentage of responses to each survey question was examined. Responses to the question querying the number of patients referred to low vision per month was categorized into low referrers (those who reported referring ≤ 5 patients per month) and high referrers (those who referred > 5 patients). Contingency table analyses compared categorical responses by these 2 groups using χ^2 tests or Fischer exact tests when there were < 5 responses in any one cell. Logistic regression models were used to determine the odds of being a low referrer versus the odds of being a high referrer and explored adjusting for potential confounders. All analyses were completed using STATA.²⁴

RESULTS

The survey was completed by 207 of 1029 eligible AGS members (20.1%). The majority (98%) of respondents identified themselves as full time fellowship trained glaucoma specialists (Table 1). Fifty-one percent reported being in practice for 1 to 10 years, whereas the remainder had 11 or more years of experience. When asked about office location, 70% reported practicing in a city environment (Table 2). There were more respondents in private practice, either group (47%) or solo (8%) than in academia (40%). Another 5% were employed by managed care or public health organizations. Most respondents (73%) were seeing more than 50 glaucoma patients each week.

Participants were asked about low vision resources in their practices (Table 2). Most respondents were close to LVS; 32% had a low vision clinic in their office or building, whereas another 52% were within 10 miles from a low vision clinic. Information such as brochures, handouts, business cards, or signs regarding low vision resources, were available in 81% of practices. Eighty-four percent of glaucoma specialists reported routinely talking to patients during clinic visits about the impact that vision loss has on their activity level or had a member of their staff who did so.

With regards to referral rates, 22% of respondents were referring more than 5 patients each month to LVS (Table 2). At least 93% of all respondents had 1 or more patients who had attended a low vision clinic, and 68% reported communicating with providers at low vision centers through phone, letter, or email, about their patients. Although 88% of respondents were actively referring at

TABLE 1. Characteristics of Responding Ophthalmologists

Characteristic	N (%) 207 (100)
Fellowship training	
Yes	202 (98)
No	5 (2)
Specialty	
Glaucoma	201 (97)
Comprehensive	2 (1)
Retina	1 (0.5)
Cornea	2 (1)
Uveitis	1 (0.5)
No. years in practice	
≤ 5	78 (38)
6-10	27 (13)
11-20	40 (19)
21-30	33 (16)
> 30	29 (14)
Practice status	
Full time	183 (88)
Part time	24 (12)
Practice location	
City	144 (70)
Suburb/rural	63 (30)
Practice type	
Academic	84 (40)
Private—group	97 (47)
Private—solo	16 (8)
Managed care/public health organization	10 (5)
Average no. glaucoma patients seen each week	
≤ 50	56 (27)
51-100	85 (41)
> 100	64 (31)

TABLE 2. Characteristics of Practices of Responding Ophthalmologists

Characteristic	N (%)
207 (100)	
Do you carry low vision information in your office?	
Yes	168 (81)
No	39 (19)
Distance to nearest low vision clinic (miles)	
0	63 (32)
1-10	102 (52)
> 10	32 (16)
Do you or someone on your staff talk to patients who have lost vision about how this might limit their activities?	
Yes	173 (84)
No	32 (16)
No. patients per month who have been to low vision rehabilitation	
< 1	13 (7)
1-5	80 (43)
6-10	59 (31)
> 10	36 (19)
No. patients per month referred to low vision services	
< 1	25 (12)
1-5	136 (66)
> 5	44 (21)
In the last year have you communicated directly with providers at a low vision center?	
Yes	135 (68)
No	63 (32)
Have you used the AAO's Preferred Practice Pattern recommendation for low vision referrals?	
Yes	44 (22)
No	154 (78)
Are you satisfied with your current low vision services referral practices?	
Yes	145 (73)
No	53 (27)

AAO indicates American Academy of Ophthalmology.

least 1 patient per month to LVS, only 22% were following the American Academy of Ophthalmology's (AAO) Preferred Practice Patterns (PPP). Overall, most (73%) respondents were content with their low vision referral practices.

Characteristics of low referrers and high referrers were also compared (Table 3). High referrers tended to be in academic practice and reported having more than 10 patients per month who had already seen a low vision provider. There was no statistically significant difference between number of patients referred and respondent characteristics such as years in practice, practice location and type, glaucoma patient volume, proximity to a low vision clinic, discussions with patients about activities affected by vision loss, and routine communication between providers and low vision clinic staff. Having information about LVS in the office was also not significantly associated with LVS referrals. However, high referrers were more likely to report having higher volumes of patients previously seen in a low vision clinic, follow the PPP, and report being satisfied with their current LVS referral practices than low referrers.

Logistic regression analyses indicate that respondents who reported following the PPP and who reported satisfaction with their low vision referral patterns were 2.8 [95% confidence intervals (CI), 1.3-5.9] and 2.6 (95% CI, 1.02-6.6) times more likely to be high referrers than low

TABLE 3. Characteristics of Those Who Refer 0-5 Patients Per Month to Low Vision Compared With Those Who Refer More Than 5 Patients Per Month

Responder Characteristic	No. Patients Referred to Low Vision Services Per Month		P*
	N (%)	N (%)	
	0-5	> 5	
	161	44	
	(100)	(100)	
No. years in practice			
≤5	63 (39)	14 (32)	0.594
6-10	19 (12)	8 (18)	
11-20	33 (21)	7 (16)	
21-30	23 (14)	9 (20)	
> 30	23 (14)	6 (14)	
Practice location			
City	110 (68)	34 (77)	0.250
Suburb/rural	51 (32)	10 (23)	
Practice type			
Academic	61 (38)	22 (50)	0.217
Private—group	81 (50)	15 (34)	
Private—solo	11 (7)	5 (11)	
Managed care/Public Health Organization	8 (5)	2 (5)	
Average no. glaucoma patients seen each week			
≤50	49 (30)	7 (16)	0.129
51-100	63 (39)	22 (50)	
> 100	49 (30)	15 (34)	
Do you carry low vision information in your office?			
Yes	127 (79)	40 (91)	0.081
No	34 (21)	4 (9)	
Distance to nearest low vision clinic (miles)			
0	46 (30)	17 (40)	0.268
1-10	78 (51)	22 (51)	
> 10	28 (18)	4 (9)	
Do you or someone in your staff talk to patients who have lost vision about how this might limit their activities?			
Yes	133 (83)	40 (91)	0.242
No	28 (17)	4 (9)	
No. patients per month who have been to low vision rehabilitation			
< 1	13 (9)	0 (0)	< 0.001
1-5	75 (51)	5 (13)	
6-10	45 (30)	14 (35)	
> 10	15 (10)	21 (53)	
In the last year have you communicated directly with providers at a low vision center?			
Yes	103 (66)	32 (76)	0.262
No	53 (34)	10 (24)	
Have you used the AAO's Preferred Practice Pattern recommendation for low vision referrals?			
Yes	28 (18)	16 (38)	0.011
No	128 (82)	26 (62)	
Are you satisfied with your current low vision services referral practices?			
Yes	109 (70)	36 (86)	0.049
No	47 (30)	6 (14)	

*χ² test used for number of years in practice and practice location. For all other comparisons Fisher exact test was used due to small cell sizes.

Bold numerals represent data that is statistically significant.

AAO indicates American Academy of Ophthalmology.

referrers, respectively (Table 4). After adjusting for the number of glaucoma patients seen per week, these results were largely unchanged. In the fully adjusted model, only the use of the PPP guidelines remained associated with

TABLE 4. Model of Increased Odds of Being a High Referrer (> 5 Referrals Per Month) Compared With Being a Low Referrer (≤ 5 Referrals Per Month)

	Univariate Model		Model Adjusted for the No. Glaucoma Patients Seen Per Week*		Fully Adjusted Model†	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Have you used the AAO's Preferred Practice Pattern recommendation for low vision referrals?						
Yes	2.8	1.3-5.9	2.8	1.3-5.9	2.5	1.1-5.3
No	Reference	Reference	Reference	Reference	Reference	Reference
Are you satisfied with your current low vision services referral practices						
Yes	2.6	1.02-6.6	2.6	1.03-6.7	2.3	0.9-5.8
No	Reference	Reference	Reference	Reference	Reference	Reference

*Two separate models were used. The results for the "average number of glaucoma patients seen each week" is from the model with "Have you used the AAO guidelines."

†The fully adjusted model includes all 3 covariates.

AAO indicates American Academy of Ophthalmology.

referral status, and those who reported using these patterns were 2.5 times more likely of being a high referrer as compared with a low referrer (95% CI, 1.1-5.3).

DISCUSSION

In this study we describe glaucoma specialist's LVS referral characteristics and report differences by high and low LVS referrer status. Surprisingly, we found that there was no association between reported patient volume and referral to LVS. Practitioners seeing a higher volume of glaucoma patients each week were not reporting that they were making more referrals to LVS than those who reported seeing fewer patients. This is an unexpected finding, as one would naturally assume that in a busier glaucoma practice, there would be a proportional volume of patients with low vision needs. This may reflect the type of glaucoma patients in a practice, as busier practices may see fewer glaucoma patients who need LVS, or perhaps in busier practices, there is less time to provide counseling on LVS or offer a referral.

Respondents to this survey were more likely to be practicing in a city than in a rural area or suburb. The reason for this may be that subspecialists tend to concentrate more in metropolitan areas where there is a larger patient volume and greater demand for specialty care. Alternatively, it could be that our response rate was higher among those practicing in an urban setting, but we cannot determine this as the AGS does not track these demographics. It has been suggested that patients are more likely to follow-up with medical care if services are located in an urban setting which may be easier to get to than those in a rural setting; inconvenient location or difficulty with transportation may influence a patient's compliance with low vision referral.²⁵ However, previous studies have demonstrated that city versus rural location of patients does not significantly influence patient's attendance to LVS.^{13,14,26} A more important factor for patient compliance is proximity of the low vision referral center to the referring doctor's office.¹³ We found that neither practice location nor distance to a low vision clinic was significantly associated with self-reported LVS referral rates; however, patient compliance with referral may vary by proximity.

We found that there was no significant difference in the percentage of reported high referrers among academia, private, or managed care practices. This implies the absence

of practice type on referral numbers, which is interesting as academic practices may have residents who help initiate patient assessment and plan referrals before final discharge by an attending ophthalmologist. In private practice, patients may have more interaction with technicians who are involved in such discussions. In fact most respondents (84%) reported being a provider in a practice which talks to patients about limitations in activity as a result of visual impairment. Although it is certainly good news that many providers report the presence of a provider who talks to patients about vision-related activities of daily living, we have no information on the quality of that interaction or if that interaction leads to referrals if needed. In fact, we found that those who reported talking to patients about vision problems did not have higher referral rates, which suggests that the conversation between patients and providers may be inadequate. Moreover, it is concerning that there remain 16% who do not have someone on staff who address low vision issues at patient visits.

In previous studies, patients have cited lack of information on LVS as a reason for nonattendance.^{13,15} In our survey, 81% of participants reported carrying information on low vision in the office. Handouts and pamphlets likely provide patients with details on available services, but it is not known what type of information is most important to increase LVS utilization. Furthermore, one might assume that ophthalmologists who keep low vision information in their offices may be more apt to refer; however, we did not find such an association. This might suggest that having printed information in the office alone is not sufficient in the referral process and that there is still a need for more; perhaps a focused discussion between patients and ophthalmologists.

Ophthalmologists who reported communicating with low vision specialists were also not more likely to be high referrers. This is an unexpected finding, as we anticipate that communication between an ophthalmologist and low vision provider would foster a relationship for referral. We did not ask detailed questions about the type of communication or the closeness of the interaction to know if current levels of communication are insufficient and greater efforts should be made on the part of both practitioners to reach out to one another regarding patients with low vision needs.

We found that high referrers were more likely to have the highest number of patients previously enrolled in LVS, follow the PPP recommendations for low vision, and report

being happy with their current low vision referral practices. These findings suggest that ophthalmologists who have the most experience with patients enrolled in LVS and who familiarize themselves with practice patterns on low vision will be more likely to refer their glaucoma patients.

However, only 22% of physicians responded that they have followed the low vision PPP in their practice. Previous studies have suggested that not all ophthalmologists are aware of the criteria for referral to LVS.^{13,19,27} As knowledge of these guidelines seems to be a factor in referral, the AAO should consider increasing education to ophthalmologists on the recognition and management options for glaucoma patients with low vision needs in an effort to improve referral rates. In addition to publishing the PPP online which appears to be underutilized, additional education at national meetings and other subspecialty meetings could increase the uptake of these guidelines.

The criteria for referral even according to the PPP are rather vague, particularly for visual field loss. These guidelines suggest that ophthalmologists “recognize” and “respond” to patients with visual acuity <20/40 in the better eye, contrast sensitivity loss, a scotoma or field loss.²⁸ There is no guidance with regards to how much loss in contrast sensitivity, how many degrees of field loss or the location of the scotoma. Difficulties with activities of daily living or quality of life concerns are also not mentioned in the PPP. There may be a need to more clearly outline LVS referral guidelines. The AAO may also want to consider creating guidelines that are specific to the kind of vision loss experienced by glaucoma patients. AMD patients experience central vision loss earlier than glaucoma patients and their functional complaints differ.²²

It is possible that glaucoma specialists are not referring in higher numbers because they do not think that current LVS address the concerns of glaucoma patients who tend to experience peripheral vision loss early on, as compared with AMD and DR patients who primarily complain of central vision loss. For example, glaucoma patients have difficulty with tasks such as walking and mobility due to peripheral vision loss. AMD and DR patients tend to experience greater difficulty with using assistive devices.²² Perhaps there is a need to create specific pathways and low vision aids targeted to the glaucoma patient population. Glaucoma specialists may find this more useful for their patients and consequently increase their referral to LVS.

Another suggestion to increase referral rates is to include an automatic referral option in electronic medical records for patients who meet low vision criteria based on findings documented in their clinical examinations or a reminder check box within the note that asks ophthalmologists whether or not they have addressed low vision needs of their patients by the end of the visit. This would serve as a reminder to ophthalmologists and their staff of the need for LVS.

Questions regarding criteria for referral and barriers to referral were asked in the survey and will be addressed in a follow-up analysis. This information can be used to understand the appropriateness of referral patterns.

Limitations

There were several limitations to this study. In an effort to capture responses from ophthalmologists most likely to be involved in the care of glaucoma patients, our survey was sent out to members of the AGS. The response rate was 20.1%, which is comparable to or better than

similar survey-based studies but still less than ideal.^{18,27,29} Although several attempts were made to reach every member of the AGS through email and postal mail, correct contact information was not available for each of the 1029 members eligible to participate. It cannot be known how many members opened the email or letter when it was received and made a conscious decision on whether or not to participate. Emails or letters may have also inadvertently been redirected to trash. The survey is anonymous and AGS does not share its member roster or demographics, thus it is impossible to know the number of those missed in the distribution of the survey. Owing to this policy, we were unable to track responders and nonresponders which may have helped us to know whether or not the demographics of the responders truly represent the entire AGS membership. The 20.1% who responded may be a biased sample. If they represent ophthalmologists who have a greater interest in low vision and are more likely to refer, our results could be overestimates.

Also, in an effort to be concise, we did not probe as deeply into some areas as might be warranted. For example, the fact that communication with a low vision provider was not a factor in being a high referrer suggest that more details about the content of that communication and more data around the relationship would be useful.

CONCLUSIONS

In summary, we found that glaucoma specialists were more likely to be high referrers to LVS if they reported following the PPP recommendations for low vision, were happy with their current LVS referral practices, and had a number of patients previously enrolled in LVS. Other factors such as the number of patients seen per week, practice location or type, in office counseling or educational material, and distance to the nearest LVS center did not differ between high and low LVS referrers. These results highlight the importance of knowledge of published PPP guidelines on LVS referrals, and imply that the general lack of awareness of these guidelines may be impacting LVS referral rates. These results further suggest a need for more discussion and education for glaucoma specialists on PPP LVS referral guidelines and possibly creating a more concrete criterion for LVS referral and expectations for the value of LVS for glaucoma patients.

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