Traditionally, clinicians relied on measurements such as visual acuity, IOP, and perimetry to gauge the severity of ocular disease and/or response to treatment. However, these results may fail to capture the entire burden of a patient’s disease. Fortunately, over time, medical decision-making has evolved from paternalism, with the provider alone determining the patient’s course of action, to patient-centered, with the patient playing a key role in his or her treatment plan.

This shift toward patient-centered care can be attributed to both an evolution in providers’ mindsets due to changes in medical education and the acceleration of patient-friendly innovation. Glaucoma specialists now have the range of tools needed to support a patient-centered outlook on medicine and to provide patients with more options to individualize their care. As such, we are able to treat not just the disease but the individual affected by it.

The steps to incorporate PROs into practice are twofold. One, we must learn how PROs relate to disease progression, and, two, we must learn how glaucoma treatments relate to PROs. Marrying these two together is imperative: If we know that worsening glaucoma causes worsening PROs, then we know that we are justified in trying to treat the disease and preserve quality of life (QOL). Now that we have access to a range of treatment options that we assume are minimally invasive and less cumbersome to the patient, we need PRO data to substantiate those claims. With both pieces of information, we can be confident in our ability to slow disease progression and preserve QOL and offer a treatment option that optimizes QOL.

**The Value of PRO Data**

In a patient-centered era of care, it is crucial to capture and integrate patient-reported outcome (PRO) data into our clinical decision-making. A multitude of PRO measures for glaucoma have been developed and implemented in several major ophthalmic clinical trials, but eye care providers have yet to effectively integrate PROs into real-world clinical practice.

**Practical PRO Measures**

In 2019, my colleagues at the University of Michigan Kellogg Eye Center and I conducted a prospective observational cohort study to examine the relationship between traditional clinical parameters and vision-related QOL. We collected data from a large cohort of patients using a short, practical vision-related PRO questionnaire, the 9-item National Eye Institute Visual Function Questionnaire (NEI VFQ-9; see NEI VFQ-9), which is a modified version of the VFQ-25.

The NEI VFQ-9 was administered to a subset of adult glaucoma patients who presented for routine glaucoma care. We then evaluated the associations between baseline VFQ-9 scores and better-eye/worse-eye best recorded vision, mean global retinal

**AT A GLANCE**

- Traditionally, clinicians relied on measurements such as visual acuity, IOP, and perimetry to gauge the severity of ocular disease and/or response to treatment. However, these results may fail to capture the entire burden of a patient’s disease.
- In a patient-centered era of care, it is crucial to capture and integrate patient-reported outcome data into real-world clinical decision-making.
- Until efforts to implement PRO measures become more formalized and widespread, glaucoma specialists can incorporate some informal QOL analysis into their clinical encounters today.
nerve fiber layer thickness on OCT, and visual field parameters (mean deviation [MD], visual field index) when the data were available for both eyes.

Strikingly, more than half of all glaucoma patients worried about their vision at least “some of the time,” despite lower reports of difficulty with driving, navigating their environment, or peripheral vision while walking. VFQ-9 scores were also much lower in patients who were older than 80 years of age. Scores dropped dramatically when the better-eye MD was worse than -12 dB and especially when it was worse than -18 dB. Patients with a lower better-eye MD (worse than -12 dB) graded their vision poorly, worried about their vision more often, and reported particular difficulty with visual tasks, including completing housework and navigating their environment. VFQ-9 scores had the strongest correlation with better- and worse-eye visual acuity, followed by MD and visual field index.

### NEI VFQ-9

1. At the present time, would you say your eyesight is:
   (1) Excellent, (2) good, (3) fair, (4) poor, (5) very poor, or (6) are you completely blind?

2. How much of the time do you worry about your vision?
   (1) None of the time, (2) a little of time, (3) some of the time, (4) most of the time, or (5) all of the time

3. How much difficulty do you have reading ordinary print in newspapers?
   (1) No difficulty at all, (2) a little difficulty, (3) moderate difficulty, (4) extreme difficulty, (5) stopped doing because of your eyesight, or (6) stopped doing this for other reasons or not interested in doing this

4. How much difficulty do you have doing work or hobbies that require you to see well up close, eg, cooking, sewing, fixing things around the house, or using hand tools?
   (1) No difficulty at all, (2) a little difficulty, (3) moderate difficulty, (4) extreme difficulty, (5) stopped doing because of your eyesight, or (6) stopped doing this for other reasons or not interested in doing this

5. Because of your eyesight, how much difficulty do you have going down steps, stairs, or curbs in dim light at night?
   (1) No difficulty at all, (2) a little difficulty, (3) moderate difficulty, (4) extreme difficulty, (5) stopped doing because of your eyesight, or (6) stopped doing this for other reasons or not interested in doing this

6. How much difficulty do you have driving during the daytime in familiar places?
   (1) No difficulty at all, (2) a little difficulty, (3) moderate difficulty, (4) extreme difficulty, stopped doing because of your eyesight, or (5) stopped doing this for other reasons or not interested in doing this

7. Are you limited in how long you can walk or do other activities such as housework, childcare, school, or community activities because of your vision?
   (1) All of the time, (2) most of the time, (3) some of the time, (4) a little of time, or (5) none of the time

8. Because of your eyesight, how much difficulty do you have noticing objects off to your side while you are walking along?
   (1) No difficulty at all, (2) a little difficulty, (3) moderate difficulty, (4) extreme difficulty, (5) stopped doing because of your eyesight, or (6) stopped doing this for other reasons or not interested in doing this

9. Because of your eyesight, how much difficulty do you have finding something on a crowded shelf?
   (1) No difficulty at all, (2) a little difficulty, (3) moderate difficulty, (4) extreme difficulty, (5) stopped doing because of your eyesight, or (6) stopped doing this for other reasons or not interested in doing this

### PROS IN RESEARCH

Slowing or halting glaucomatous progression is important to preserving QOL, but the means by which we impede progression is undoubtedly relevant to QOL as well. This is where new technologies play a role. MIGS, early laser treatment, sustained implantable drug delivery, and compounded medications are effective treatment options that may lower IOP and carry less morbidity than other therapies. We can typically...
offer these interventions earlier in the disease course, in good conscience that we are not subjecting patients to treatments that are more burdensome than the disease itself.

QOL assessment has been incorporated into some recent studies evaluating glaucoma treatment options. In the Laser in Glaucoma and Ocular Hypertension (LiGHT) study comparing selective laser trabeculoplasty (SLT) versus drops as first-line treatment, the primary outcome measure was health-related QOL at 3 years, assessed using the European Quality of Life-5 Dimensions (EQ-5D). The EQ-5D focuses on five dimensions of QOL: mobility, self-care, usual activity, pain or discomfort, and anxiety or depression. The study authors noted that the EQ-5D has a weak sensitivity for detecting glaucoma-specific effects on health-related QOL, which may, in part, have contributed to why SLT was not shown to be superior to drops with respect to the EQ-5D. The study’s secondary outcome measures—which included QOL assessed by the Glaucoma Utility Index, patient-reported disease and treatment-related symptoms assessed with the Glaucoma Symptom Scale, and patient-reported visual function assessed with the Glaucoma Quality of Life-15 questionnaire—generally suggested better QOL with SLT.

The EQ-5D questionnaire was also used to measure the health status of participants in the Effectiveness of Early Lens Extraction for the Treatment of Primary Angle-Closure Glaucoma (EAGLE) study, which assessed the effectiveness of early lens extraction for the treatment of primary angle-closure glaucoma. EAGLE investigators also used the NEI VFQ-25 to assess the effects of vision problems on vision-targeted functioning and health-related QOL. They found that the EQ-5D and NEI VFQ-25 scores were both higher in the clear lens extraction group compared with the standard care (laser peripheral iridotomy and topical medication) group.

The use of PRO in the evaluation of future glaucoma treatments has rightfully become a priority of the ophthalmic leadership. The FDA is working with the American Glaucoma Society (AGS) and academic institutions to quantify patients’ preferences to aid in the evaluation of MIGS devices and to incorporate PRO measures into the assessment of novel glaucoma devices. A standardized methodology for assessing QOL would be immensely valuable, particularly as more MIGS trials are underway.

PROS IN PRACTICE

Until efforts to implement PRO measures become more formalized and widespread, glaucoma specialists can incorporate some informal QOL analysis into their clinical encounters today. With my patients, this typically comes in the form of patient-centered counseling. I aim to present the facts and my recommendations, enabling patients to reach an informed decision about treatment. Ultimately, however, if we knew how different treatments affected patient QOL, we would better be able to help pair the right treatment to the right patient.

As physicians grow busier, it will become increasingly important to formally and efficiently gather data from our patients. A short, practical PRO measure, such as the VFQ-9, could provide a valuable snapshot of visual function. Validation of such a measure, along with correlation to traditional measures of disease activity, will add to its clinical utility. Although most patients may report no changes on their questionnaires, the ability to quickly identify the few who are struggling would be highly meaningful. By tackling both disease monitoring and disease treatment with PROs, we can ultimately provide patients with an opportunity to receive care that is truly designed to optimize QOL.

Author’s note: The data shared in Practical PRO Measures derive from the Sight Outcomes Research Collaborative (SOURCE) Ophthalmology Data Repository, which captures electronic health record data of all patients receiving eye care at academic medical centers participating in the research collaborative. SOURCE captures information on patient demographics, diagnoses identified based on International Classification of Diseases billing codes, and structured and unstructured (free-text) data from all clinical encounters (clinic visits, operative reports, etc.). The SOURCE repository also includes results from ocular diagnostic tests.

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