REMOTE DIAGNOSTICS FOR CLOSER CLINICAL TEAMWORK




Home solutions connect physicians and patients in the quest for a fuller diagnostic picture.

BY RICHIE KAHN, MPH; DORIAN DE MAIO; BARBARA WIROSTKO, MD, FARVO; AND CRAIG CHAYA, MD

Whether for measuring IOP or performing mobile perimetry, home monitoring can be an effective way to gather data points between visits and outside of traditional clinic hours. The result is data-driven treatment that can be tailored to the individual patient. In this roundtable discussion, physicians and patients exchange ideas on the use and value of home tonometry for all members of the care team.

—Richie Kahn, MPH

Richie Kahn, MPH (R.K.): Thanks so much to you all for joining this conversation. Before we begin, let's do some quick introductions. I'm a patient with a rare and progressive form of optic atrophy and a clinical trial participant. Professionally, I'm a clinical researcher and patient advocate working to reduce the time it takes to bring promising new therapies and diagnostics to market.

Dorian De Maio (D.D.M.): I am a retired aerospace engineer. I have been a long-time glaucoma patient of Barbara's and Craig's.

Barbara Wirostko, MD, FARVO (B.W.): I'm an adjunct professor in the department of ophthalmology at the John A. Moran Eye Center and the department of biomedical engineering at the University of Utah. I am also the medical director and cofounder of a company called MyEyes, which helps to get home tonometers into the hands of patients.

Craig Chaya, MD (C.C.): I'm an associate professor of ophthalmology at the John A. Moran Eye Center at the University of Utah. My focus is on cataracts, anterior segment, and glaucoma care.

R.K.: Craig, how did you learn about home monitoring, and what impact has this technology had on you as a clinician and on your patients?

C.C.: I was as an internist before becoming an ophthalmologist. Home monitoring technologies have long been used in internal medicine, so I've been patiently waiting for the ophthalmic space to catch up. We've had glimpses of home monitoring in ophthalmology over the past 5 to 8 years, but what really thrust the iCare Home technology (Icare USA) into the spotlight was COVID-19. Home monitoring and teleophthalmology came to the forefront at the peak of the pandemic. At the Moran Eye Center, our first foray into measuring IOP outside the clinic was doing drive-by pressure checks for patients who were nervous about coming inside the building. Before the pandemic, our department had discussed acquiring the iCare technology for patients to use at home, but the pandemic strengthened our interest.

R.K.: What about you, Barb? I know you are quite familiar with the iCare Home.

B.W.: I was introduced to the iCare Home by a patient with advanced glaucoma. His pressure was spiking at night, and he had challenges accessing the iCare Home because it was not readily available for purchase. That incentivized me to try to get this device into patients' hands, even on a rental basis. We have known for years that IOP is a dynamic, variable measurement, yet we have never really focused on spikes occurring outside of the clinic in our management. With the iCare Home, information on variability in IOP made me see the value of remote monitoring because it actually influenced my case management.

R.K.: I have used the iCare Home and a few investigational mobile perimetry devices. Despite copious training, I struggled a bit with the iCare Home. But, in my 10 days of use, I absolutely saw the value, as did my clinical care team. We learned that I do not have diurnal fluctuations in pressure. With my form of optic atrophy, although it is monitored like glaucoma, IOP is not as much of a factor as my visual fields. Overall, I loved having the ability to

test on my own schedule, and I found it was a great way to evaluate my visual fields and connect with my clinician between visits. Dorian, you are experienced with the iCare Home, right?

D.D.M.: I have been using the iCare Home for about 1.5 years, and it was first brought to my attention by Barbara. I was under her long-term care, and my pressures were generally controlled during the day. But, we noticed on visual field testing that my better-seeing eye was beginning to deteriorate. Barbara suggested that my IOP might be spiking at night, and that was the impetus behind my getting the iCare Home. As it turns out, that finding prompted me to undergo surgery with Craig. With home monitoring, we could then get my baseline pressures before and after surgery and monitor my progress throughout recovery. That guided, I think, both Craig and Barbara to determine my next treatment and continue to monitor my IOP. Now, if I see my pressures beginning to spike, I can communicate with Barbara, and she can tweak my medication regimen to even out my measurements.

B.W.: Not all IOP-lowering agents are equally effective at minimizing IOP spikes, and surgical procedures vary in efficacy for minimizing nighttime spikes. As we look at sustained IOP lowering via implants, devices, drugs, etc., the iCare Home can enable us to see if the effect of a treatment starts wearing off or efficacy begins to wane without requiring the patient to come running into the clinic every other day or week.

D.D.M.: Barbara and Craig had told me that my treatment might last around 6 months. At about the 6-month mark, I started monitoring my pressures carefully and noticed that, almost right on schedule, they began to increase during the day. Barbara was able to adjust my medication regimen to keep those peaks down. Without home tonometry, I would have had to schedule an appointment to be seen, which might have taken a couple of months. But here, I had an immediate result, which informed Barbara of my condition.

R.K.: There is substantial value in home monitoring, keeping tabs on disease progression, and knowing what is happening between clinic visits. However, home monitoring is not the norm, at least not yet. Barbara and Craig, what did you first think when you heard about home monitoring? When you talk about home monitoring with your colleagues, what is the typical response?

C.C.: When you look at the big datasets from landmark clinical trials, home monitoring was not available at the time they were conducted. Some glaucoma specialists have reservations about making clinical decisions based on home monitoring because they are accustomed to using in-office readings. But, a lot of times in medicine, we take the best data available and then stretch them slightly for real-world application. Home monitoring provides a more complete diagnostic picture. Rather than have a patient come in for multiple visits at different times of day to create a snapshot, I can have a patient obtain as many pressure readings in a week as we would typically get in 2 years in clinic.

The reality is that many patients' glaucoma is undetected. If we rely on traditional means of screening at regular office visits, there is not enough time in the day to manage all these patients. It gives me a sense of relief that patients are empowered to manage their condition and can alert me to any changes. My hope is that one day the iCare Home or other home-monitoring devices will be as accessible as blood pressure cuffs for hypertension.

B.W.: One thing I find fascinating is that we don't really understand why certain patients experience IOP spikes. I have had patients with ocular hypotension and IOPs in the low 20s mm Hg, but they do not have damage; I'll ask them to use the iCare Home for a week, and we'll see no fluctuation. Although home monitoring sometimes makes us realize that we need to be more aggressive, it may also enable us to step back and confidently continue to observe a patient. But, it is that totality of data that is important. It is not possible to diagnose or monitor glaucoma with one IOP measurement or one visual field test.

R.K.: Is there a particular type of patient or clinical profile that could benefit the most from home monitoring, or is the technology more broadly applicable?

C.C.: Patients are impressed by the drive to understand their disease and to get as much data as possible to make an evidence-based decision. When I show patients the graph from the iCare Home test, many of them are surprised to see their pressure fluctuations. They are grateful that we can quickly decide to introduce a treatment to blunt those pressure spikes. It is also reassuring for patients to know if their pressure is fairly well controlled and we can safely continue to monitor them.

B.W.: I agree. As Dorian mentioned, visual fields have a subjective element. There is a lot of variability from test to test. We noticed a subtle change on Dorian's visual field test that was questionable. When we monitored him with the iCare Home, we saw that the progression was real. This changed our case management and more quickly led us to surgery.

D.D.M.: From a patient point of view, when you go to the clinic on a periodic basis and know that your

pressures may vary according to the day, you feel a bit hopeless and like you have no control. With the iCare Home, you can build a closer relationship with your provider and feel like you are part of the treatment, or at least like you can have an impact on the treatment plan. It is reassuring for the patient to be involved and to be a part of the health care team.

C.C.: With all this interest in home monitoring, we have yet to have a large trial or a cohort of patients in whom we can diagnose wild IOP fluctuations, propose an intervention to flatten the curve, and then confirm that doing so prevents visual field loss. As clinicians, we may feel that it is important to flatten the curve to prevent further optic nerve damage, but we have yet to confirm this with a large dataset. My hope is that, over time, as remote IOP monitoring becomes more common, we can pool data from numerous clinicians and confirm this hypothesis. I predict that, in the future, this will be part of large clinical trials, not just looking at typical in-office pressure but also looking more closely at diurnal fluctuation.

B.W.: Some pharmaceutical companies are looking to use this technology, as it could help differentiate the next IOP-lowering drop. We have many IOP-lowering medications to choose from, but which is best for flattening that curve? Also, IOP-lowering drops essentially get approved on three time points during the day. I wonder, down the road, whether we should start thinking more about that 24-hour curve.

R.K.: The pathway to approval for a device's home use is not clear-cut. Barbara, with the regulatory hurdles and prescription requirements, how do you, through your practice and through MyEyes, address these challenges?

B.W.: The iCare Home is regulated through a 510(k) clearance as a prescription device to be used in conjunction with clinical IOP measurements. It is not meant to be used as a standalone device but as a complementary device, and it requires a prescription. Patients regularly find that their doctors do not support writing that prescription, so the best we can do is educate our peers. There may be some challenges with accessing and learning to use the device, but once the patient is comfortable, I don't see any downside to its use. It provides more information and data, and it enables us to look at trends, which are important in glaucoma care.

R.K.: Craig, in your experience, is there a learning curve?

C.C.: The iCare Home technology is rebound tonometry, which we have had for years, even before the iCare device became available. One issue is that some of the patient onboarding and training have been done remotely, which can be challenging. A few patients have had to come in for hands-on training to ensure that they are using the device correctly. Additionally, its use requires a patient to be somewhat coordinated. We usually have patients use the device for at least a week to take the first few days to get comfortable and understand how it fits on their face. After a few days, patients tend to get the hang of it and can quickly obtain the measurements needed. For the most part, I have found it easy to implement in the clinic and for patients to understand how to work with the device at home.

D.D.M.: I can attest to that. I was fortunate to have about 30 minutes with a technician to show me how to use the device. After a number of missteps in the first 15 minutes, I caught on quickly, and its use became almost second nature, even in the middle of the night.

B.W.: It is nice that no anesthetics are required. The patient may feel a sensation on their eyelashes but no discomfort or pain. The device also has built-in sensors to indicate whether it is centered on the eye, whether it is perpendicular to the cornea, and whether the reading is good, excellent, or poor. That device feedback helps the patient.

R.K.: Dorian, based on your experience, would you recommend home monitoring to other patients, and what tips would you give them?

D.D.M.: I would definitely recommend it. I was just as curious as Barbara and Craig about my condition and what was driving my situation. The device's use requires a good working relationship with your doctor, and I am fortunate to have doctors who have been responsive to the changes in my pressure. I would tell other patients to stay with it. At first, patients might be put off by the rebound technology, but ultimately it is a nonissue.

B.W.: We know from large, prospective studies that higher IOP and more fluctuation can lead to optic nerve damage. I wonder, how many patients are we missing because their IOP in the clinic is normal? I personally had started using this more in patients with advanced damage and normal tension or very asymmetric damage. It sounds like Craig may be giving it to more of his patients, even healthy individuals or those with ocular hypotension.

C.C.: Ultimately, our goal is to prevent morbidity from glaucoma—we want to keep patients seeing well into their later years. I think we will find, as is true with many chronic diseases, that earlier intervention is best. There comes a point in glaucoma care at which interventions have less bang for the buck in terms of preventing disease progression. Whereas before I would rely on months' or even years' worth of data before intervening, I

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can now make decisions more quickly if I have a patient who I suspect is losing vision owing to uncontrolled IOP. It can be tough to recommend surgery to a patient, but with home monitoring, it is easier to show patients that they need an intervention sooner rather than later.

B.W.: Good point. How many times in the past would we continue to add another eye drop and have the patient come back in 3 months to repeat visual field testing? Glaucoma is a chronic, progressive disease, and, with current interventions, the risk of morbidity is low. If we can intervene earlier and not wait for damage to occur, that is a huge improvement in care. It is fun to be a glaucoma specialist these days. ■

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