

PUTTING VISION MONITORING IN THE HANDS OF PATIENTS WITH AMD

The future is remote. Embrace it.

BY S.K. STEVEN HOUSTON III, MD



Digital health technologies have exploded over the past few years, and tech companies around the world have developed remote technologies to monitor physiologic data, including glucometers, spirometers, pulse oximeters, heart rate and blood pressure monitors, electrocardiographs, nutritional and diet trackers, neonatal temperature devices, sweat monitors, and more.

One company has even developed a device for telemedicine visits, to enable remote examination by a physician. This device can allow the remote physician to take vitals (eg, heart rate, blood pressure, pulse oximetry, temperature); listen to the heart, lungs, and abdomen; and look at the skin, ears, nose, throat, and external eyes.

In general, telemedicine visits are increasing every day, and most insurance groups are covering these remote visits. For those who say telemedicine and remote home monitoring are dreams of the future, I say the future is now.

THEN AND NOW

The Swiss ophthalmologist Marc Amsler developed the Amsler grid in 1945, and, since then, it has been

the primary method for patients to monitor changes in vision secondary to diabetic retinopathy (DR), age-related macular degeneration (AMD), and other macular diseases.¹ The macula is a prime area of the retina for disruption.

As a technology nerd, I keep my eye on up-and-coming technologies in medicine. The US Food and Drug Administration has cleared two technologies that allow home monitoring of visual changes due to DR, AMD, and other macular diseases. The ForeseeHome AMD Monitoring Program (Notal Vision) was the first to reach the market.

Data from the AREDS2-HOME Study Research Group showed that home vision monitoring with this device led to earlier detection of conversion from dry to wet AMD. Patients with earlier detection had better vision at the commencement of anti-VEGF treatment.² A follow-up report concluded that telemonitoring may alter the management of patients with AMD and improve outcomes.³

The second FDA-cleared technology is the myVisionTrack app (mVT; Vital Art and Science), which I have been using for more than 2 years. I gravitated toward mVT because there is extensive scientific data available that validates the shape discrimination testing that the app uses (Figure 1).⁴⁻⁶ Also, because it is an app, it is easily accessible via smartphone and tablet. (Despite the fact that most patients who attend a retina practice are age 65 years and older, most of

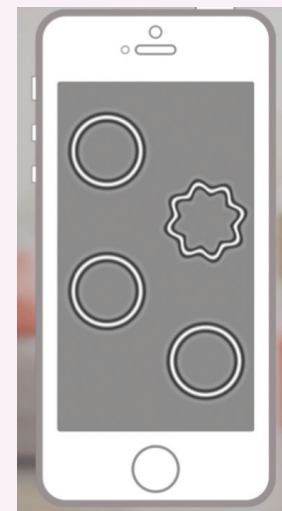


Figure 1. Patients use the myVisionTrack app twice a week to test their ability to identify a unique shape.



AT A GLANCE

- Amsler testing requires a patient to subjectively identify that something has changed and then to schedule an appointment with his or her eye care provider.
- Remote home vision monitoring as a screening tool for patients with AMD presents an exciting opportunity for earlier detection and improved outcomes.

“It is recommended that patients use the mVT app at least twice each week. Their test results are immediately uploaded to the cloud, where sophisticated algorithms plot and analyze the data.

my patients are technologically savvy.)

To learn more about both systems, including how they work, check out the *Retina Today* articles highlighted in the sidebar “A Deeper Dive Into Home Monitoring Options.” In this article I discuss my clinical use of the mVT app and how I see it being used in the future.

THE mVT APP IN PRACTICE

In talking with my patients who had been using the mVT app, their overwhelming reactions were that vision testing was fast, easy, and fun. When I heard the word “fun,” I asked why it was fun for them, and most responded that using the app was like playing a game, and they actually enjoyed it. (As an aside, digital health technologies that include gamification tend to have higher rates of compliance.^{7,8})

When I see patients with DR and non-visually significant diabetic macular edema (DME) or dry AMD who are at risk for choroidal neovascularization (CNV), I first ask them if they use or have access to a smartphone or tablet. If they do not, I explain how to use an Amsler grid. If they do use either technology, then I briefly discuss how the mVT app works. A large majority of patients express interest in the service, and, when someone does, I have one of my staff follow up with him or her to provide further information, including the prescription code that is required in order to start using the service.

It is recommended that patients use the mVT app at least twice each week. Their test results are immediately uploaded to the cloud, where sophisticated algorithms plot and analyze the data. Physicians and approved staff can access the cloud-based platform, which includes an intuitive interface that allows quick assessment of active users, including compliance with testing, data point tracking, and alerts. I have instructed my clinic to email alerts to

me when improvements or worsening are detected, so that I do not always have to log in. I also designate one of my staff to receive email alerts.

Alerts indicating that patients have a possible worsening condition trigger a contact within 24 hours, instructing the patient to come in for evaluation. The platform allows us to contact patients through several modalities, including text message, email, and voice call.

MY “AHA” MOMENT

Early in my use of the mVT service, a 68-year-old patient with dry AMD was referred to me. She was asymptomatic,

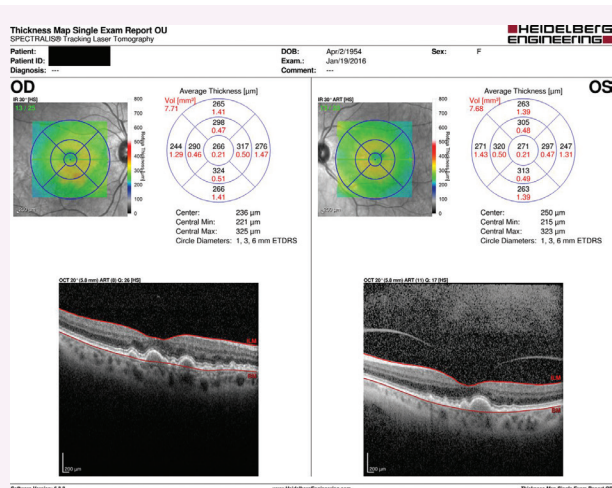


Figure 2. Asymptomatic 68-year-old patient with dry AMD. Fundus examination and SD-OCT at baseline showed intermediate and large drusen without CNV or exudation.

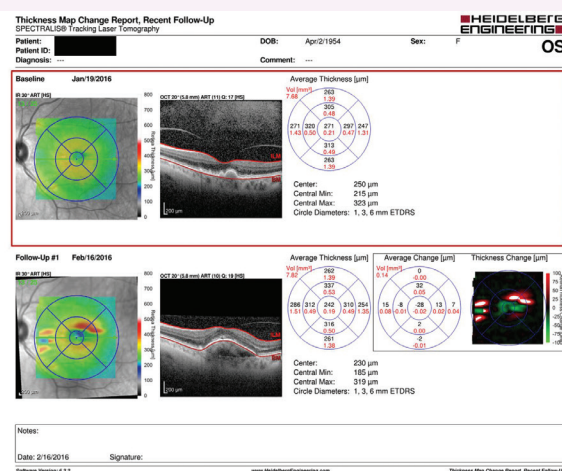


Figure 3. After 4 weeks of home monitoring, the mVT app detected a worsening in vision. A large pigment epithelial detachment with subretinal fluid were observed on SD-OCT.

A DEEPER DIVE INTO HOME MONITORING OPTIONS



Want to know more about the technologies mentioned in this article? Check out the *Retina Today* archive.

- **Michael J. Elman, MD**, wrote last year about the ForeseeHome AMD Monitoring Program. Read his article “Home Monitoring of Dry AMD Patients” at bit.ly/Elman416.
- In 2015, **Raj K. Maturi, MD**, detailed for us how the mVT system works in his article “A New Self-Testing System for Patients With AMD or DME.” Read it here: bit.ly/Maturi515.

with 20/50 visual acuity in each eye. Fundus examination and spectral-domain optical coherence tomography (SD-OCT) showed intermediate and large drusen without CNV or exudation (Figure 2). The patient owned both an iPhone and an iPad. I discussed testing with a standard Amsler grid versus using the mVT app, and she was immediately interested in the latter option. I sent her home with the instruction to use the app two to three times per week, and I scheduled her to see me again in 6 months.

To my surprise, I received an alert signaling a worsening in this patient’s testing just 4 weeks later. She came in the next day, and my examination and SD-OCT showed a large pigment epithelial detachment with subretinal fluid (Figure 3). Her visual acuity had decreased to 20/60, and she reported a small change in vision, but she had attributed it to a change in her eyeglass prescription. The patient reported that, if it were not for the mVT app, she would not have made an appointment to come in as a result of the change in vision.

This is the aspect of home vision monitoring that I find most important—the fact that it is not subjective. Amsler testing requires a patient to subjectively identify that something has changed, and subtle changes are often difficult for patients to notice. Even when they do recognize a change, they may attribute it to a more benign

cause, such as dry eye or a change in their prescription. Additionally, Amsler testing requires the patient not only to identify the change, but then to call and schedule an appointment. The mVT app gathers objective data and uses algorithms to determine subtle changes that can initiate an emergent follow-up. As for the patient described above, treatment with an anti-VEGF drug was initiated at the earliest point of conversion, leading to stabilization in the disease and in her vision.

THE FUTURE IS NOW

Remote home monitoring makes sense to many physicians and has the potential to improve outcomes for our patients. There is mounting evidence that we can improve patient outcomes through early detection and treatment.

I primarily use the mVT service as a screening tool for high-risk patients. Used in this way, remote monitoring presents an exciting opportunity for earlier detection and improved outcomes.

Home monitoring also has potential for use in other macular conditions, including DME, epiretinal membrane, and myopic macular degeneration. Another promising use of this technology is as an adjuvant tool to help guide treatment decisions in patients undergoing anti-VEGF treatment. Could home monitoring offer insight for treat-and-extend protocols or signal the need to re-treat when as-needed protocols are used? Could it benefit patients who have been extended to treatment every 3 months and who must now consider stopping treatment? These are important questions, but clinical studies are needed in order to answer them. ■

1. Amsler M. Earliest symptoms of diseases of the macula. *Br J Ophthalmol*. 1953;37(9):521-537.
2. Chew EY, Clemons TE, Bressler SB, et al; AREDSD-HOME Study Research Group. Randomized trial of a home monitoring system for early detection of choroidal neovascularization home monitoring of the eye (HOME) study. *Ophthalmology*. 2014;121(2):535-544.
3. Chew EY, Clemons TE, Harrington M, et al; AREDSD-HOME Study Research Group. Effectiveness of different monitoring modalities in the detection of neovascular age-related macular degeneration: the Home Study, Report Number 3. *Retina*. 2016;36(8):1542-1547.
4. Wang YZ, Wilson E, Locke KG, Edwards AO. Shape discrimination in age-related macular degeneration. *Invest Ophthalmol Vis Sci*. 2002;43(6):2055-2062.
5. Wang YZ, He YG, Mitzel G, et al. Handheld shape discrimination hyperacuity test on a mobile device for remote monitoring of visual function in maculopathy. *Invest Ophthalmol Vis Sci*. 2013;54(8):5497-5505.
6. Kaiser PK, Wang YZ, He YG, et al. Feasibility of a novel remote daily monitoring system for age-related macular degeneration using mobile handheld devices: results of a pilot study. *Retina*. 2013;33(9):1863-1870.
7. Miller AS, Cafazzo JA, Seto E. A game plan: gamification design principles in mhealth applications for chronic disease management. *Health Informatics J*. 2014;22(2):184-193.
8. Rose KJ, König M, Wiesbauer F. Evaluating success for behavioral changes in diabetes via mHealth and gamification: mySugr’s keys to retention and patient engagement. <https://assets.mysugr.com/website/mysugr.com-wordpress/uploads/2017/03/attd-2013-poster.pdf>. Accessed May 17, 2017.

S.K. Steven Houston III, MD

- retina surgeon at Florida Retina Institute
- financial disclosure: consultant, Vital Art and Science
- @triedoc; shouston3@gmail.com