

Telemetry for Glaucoma Management During the Pandemic

Kaweh Mansouri shares the pros and cons of using telemedicine – including remote measurements – for glaucoma patients

In order to appropriately manage glaucoma, the clinician needs at least three parameters measured reliably: IOP measurement, the patient's visual field, and fundus exam in the form of OCT or fundus photography. None of these measurements can be taken easily and consistently at home. For IOP, there are home tonometry devices available, but they're not common and at least one third of patients has been shown to struggle to obtain reliable measurements despite previous training. There are sensors, such as Eyemate (Implandata, Germany) approved in Europe that can be implanted in the eye during cataract or glaucoma surgery, which stay in the eye for the patient's lifetime and measure the IOP at any given point. The implants are connected to an external device, which can transmit the results to the physician. These sensors came in very useful during the initial

COVID-19-related lockdowns. Studies have shown that the data transmitted by the sensors proved useful for monitoring patients during the first lockdown when it was impossible for glaucoma specialists to see the patients (1). For those patients whose target IOP was as expected, this was reassuring news for the patient and the physician and avoided unnecessary visits, and in the few cases where the IOP measurements were higher than expected, additional medication was sent to the patients or they were invited in for surgery.

For one of these studies, we had access to 8415 IOP measurements from 370 measurement days of 24 patients. We looked at variations of IOP in a short-term period of three months, and a longer one of one year and beyond. We found that even during the short period, the IOP was only moderately reproducible, and in the longer term it wasn't reproducible at all – the variation was huge. This shows that our current way of measuring IOP is insufficient. It is almost surprising that we manage our glaucoma patients as well as we do with such imperfect data, but think what we could do if we had access to other types of data, such as night-time measurements, data obtained during daily activities, and similar. The types of patients' daily activities and the way they impact on their IOP measurements should be taken into account for risk stratification, in a truly patient-centric model of glaucoma management.

As I mentioned, IOP is only one of

the three key elements of assessing glaucoma progression. I have now seen really interesting start-ups offering approaches to obtain visual field measurements and fundus photography or OCT at a patient's home. It seems like telemedicine, and telemetry in particular, has made huge advances over the past few months. These innovations can be extremely useful as we navigate managing our patients' glaucoma effectively in difficult circumstances, so I hope we can continue using them even when we are no longer in a pandemic.

Nevertheless, I don't think these technologies will replace office visits. In my opinion, there are three components that make face-to-face appointments unique. First, patients simply like to see their physician in person. There is an important relationship that develops with patients who suffer from a chronic disease such as glaucoma that is best cultivated in person. Second, there are some interventions, such as SLT, that can be done immediately, on the same visit, when the need arises. Third, in-person visits are hugely valuable for educating fellows and residents.

Reference

1. K Mansouri et al., "Intraocular pressure telemetry for managing glaucoma during the COVID-19 pandemic," *Ophthalmol Glaucoma*, 4, 445 (2021). PMID: 33358988.

Glaucoma and the Pandemic

How has glaucoma care and management changed since the start of 2020?

Anthony Khawaja, Consultant Ophthalmologist at Moorfields Eye Hospital and UCL Institute of Ophthalmology, London, UK

The way we started managing glaucoma when the pandemic started might be partly what we have been aspiring to, but this transformation of the way care for patients has been forced upon us quite suddenly. Glaucoma specialists have known for a long time that with the aging population, the way we used to manage patients was unsustainable. This is where virtual clinics/telemedicine come in, where the patient's data is collected without the need for them to see a physician. What follows is an asynchronous review of that data, with the specialist making contact with the patient by letter or phone call.

Risk stratification is a crucial aspect of this type of care. We always aimed to assess risk accurately, but we would often test even our low-risk patients frequently. Now – this has had to change. Surgical strategies have also been adapted, with surgeons considering approaches requiring less intensive follow ups.

There are many patients who will come to harm due to delays in their glaucoma management, but there is a big number of them who will not. There are even patients who stop using their anti-glaucoma eye drops and are better for it, as the side effects are gone, and their disease doesn't progress.



Anthony Khawaja

The issue is, we don't know which patient belongs to which risk group, so reviewing available evidence is crucial. Originally, at Moorfields Eye Hospital, we didn't have a proper system for analyzing these data, and we would go through each set of notes individually. A system has slowly been developing, relying heavily on the risk assessment done by the last glaucoma specialist who saw the patients (how long they thought the patient should wait for their next appointment) and average intervals between the patient's visits – the longer the average intervals, the more stable the patient is deemed to be. In the near future, we need better, more objective ways of stratifying risk,

such as using visual field mean deviation and other factors.

Before the pandemic, our healthcare services in the UK were completely stretched, and now the capacity has reduced again due to social distancing, so risk stratification has helped us deal with this situation.

Constance Okeke, glaucoma specialist at Virginia Eye Consultants, Assistant Professor of Ophthalmology, Eastern Virginia Medical School, Norfolk, Virginia, USA

Since the start of 2020, there have been a number of changes to my practice.

“Surgical strategies have been adapted, with surgeons considering approaches requiring less intensive follow ups.”

My team and I have had to change the way in which we approach patients in our clinics, as many of them weren't feeling comfortable coming into our office. For the first time, we introduced telemedicine in glaucoma treatment – it was a completely new model. We used a hybrid technique of patients coming in just for diagnostic tests, which we would follow up with a phone call to review the test, along with the exiting medical records. We would assess whether the patient was stable or if there was a need for intervention – a change in management or a laser procedure. It was a challenge to implement this in a practice with multiple clinicians. I developed my own risk stratification algorithm – dependent on how often patients had visits scheduled in the past, changes in their medications, and the stage of their disease – and giving patients a green, amber, or red light, making sure that “red lights” would be brought in for an appointment as soon as possible.

Looking at the patient population at this time, I realized again what a disruptive disease glaucoma can be. Many



Constance Okeke



patients who had missed their appointments and ran out of medication did not get in touch, and once they came in for a visit, I noticed that their disease progressed substantially. As a result, I started doing a lot more surgical interventions to make up for the time when glaucoma wasn't kept under control.

Now, I have even more appreciation for the importance of educating our patients about how vital appropriate monitoring of the condition is. One-on-one education with a patient is great, but it requires the patient to be in front of us. Another way is using online videos, such as my educational series. We should also be reaching out to patients via text or email to remind them of their appointments, as well as give them information about safe ways to visit the clinic. If they don't feel it is safe to come in, they should be offered a virtual visit. Patients have to be absolutely clear that refilling their medication should be their first priority, and it can be done with a simple phone call when they are close to running out.

Kaweh Mansouri, glaucoma specialist, Consultant Ophthalmologist at Montchoisi Clinique in Lausanne, Switzerland and Department of Ophthalmology, University of Colorado, Denver, USA

Various countries have had different strategies to cope with the COVID-19 pandemic as they have been affected differently. Of course, they also have a different density of ophthalmologists, and glaucoma specialists specifically. Switzerland has a high density of ophthalmologists, and we don't tend to rely on optometrists as heavily as ophthalmologists in some other countries, so we have not made much use of virtual clinics and asynchronous reviews. During the first lockdown, non-urgent glaucoma treatments were stopped – in our clinic, 95 percent of our glaucoma patients' care fell into this category. We asked patients not to come into the clinic for six to seven weeks, and then got to work on the backlog of cases. We extended our working hours and added Saturday clinics. After that, it was the “new normal” glaucoma management, which has meant that we see our elderly glaucoma patients more or less as often as we did before the pandemic began. It seems to me that visits take longer now, as patients have more trouble understanding what we are saying due to facemasks.

We have done more SLT procedures, as they don't require patients to be as dependent on medications, and we have done some virtual visits, which we had not done before, but – in my experience – they haven't amounted to more than 5 percent of all glaucoma appointments, and we only offer them to younger patients who have stable glaucoma.

To stratify risk properly, we need an objective and efficient AI system that will analyze centralized data – technology will help us greatly in the future. Innovative healthcare systems with digital centralized databases will get there quicker than others.



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