

## OPHTHALMOLOGY APPS:

The mobile phone, with an estimated 6.8 billion subscription worldwide, equivalent to 96% of the world population, has become arguably the fastest-spreading technology in the human history. The term “digital health” is often used to describe the application of smartphones and tablets to medicine and public health, and digital health, according to many, is the future. These mobile devices and their apps promise to help modernize a practice by improving practice efficiency and enhancing patient education. Revolution in mobile applications is shaking up the healthcare sector and ophthalmology is no exception. For Apple’s popular iPhone and iPad, there are currently more than 60 ophthalmology related applications available for download in the iTunes store, and more are coming on stream all the time. The applications cover a broad range of clinical and educational use, many free, some with a nominal fee and the most expensive for an eye-popping \$550. Some apps such as the Eye Handbook seek to offer a one-stop diagnostic and reference tool for ophthalmologists, while a large number of individual testing or screening apps are available for visual acuity, visual field, contrast sensitivity, toric IOL calculations, glaucoma screening and much more. Eye Handbook, has logged over one million downloads and more than 25,000 registered users. Reference and educational apps are also in plentiful supply, giving ophthalmologists instant access to texts such as the Atlas of Ophthalmology or Clinical and Experimental Ophthalmology. More than 3,000 surgical videos can also be consulted on a smartphone via the popular EyeTube application. While younger ophthalmologists have unsurprisingly been the early adopters of mobile technology, their more seasoned colleagues are now following suit in ever-increasing numbers. Some of these user interfaces for these newer devices are just so intuitive, you don’t need to be particularly tech-savvy to navigate on them and be able to pull out the information you need.



**CRITICAL MASS:** ‘Much of the momentum behind the uptake in mobile apps is also coming from patients’, points out Stephen H Sinclair MD, a retinal specialist in private practice in Media, Pennsylvania, US, who developed the iVFQ app, a quality-of-life, visual function questionnaire based on the National Eye Institute VFQ 25 and intended for use with patients having moderate vision loss associated with ocular disease. ‘There is a desire on the part of patients to have more control over their health, with more and more patients proactively asking what they can do to improve their health. We are also seeing huge marketing behind this trend with companies like Microsoft and Google realising that the next big wave of Internet devices are probably going to be 24/7 health monitoring devices. It is really just beginning,’ he said.

**VISUAL FUNCTION:** Even without downloading a specific application, most smartphones already have the capability to make life easier for the busy ophthalmologist thanks to the device’s built-in camera, says Allon Barsam MB, BS, MA, FRCOphth, a consultant ophthalmic surgeon in the UK. “A standard photo application on any smartphone allows you to take very good quality slit lamp photographs of the anterior segment,” he said. “I use the iPhone camera regularly as a way of monitoring disease progress in the clinic or to help explain particular pathologies to my patients. A dedicated slit lamp camera can be expensive and technically difficult to master, whereas the iPhone gives ophthalmologists a quick and efficient way of documenting and recording what is happening with a patient’s eye,” he added.



While testing patients it became clear to Dr. Christophe Huber MD, a retired ophthalmologist in Zurich, Switzerland, and his co-workers that not only could a type of modulation transfer function be measured and stored, but that they had in the process created a practical low-vision test (App Store “Contrast Vision” \$9.90). The app may be particularly useful to monitor the efficacy of anti-VEGF treatment for AMD patients.

**COLOUR VISION TEST:** Dr Barsam also uses other apps such as the Eye Handbook and Snellen, a free app that includes an Ishihara colour vision test. It is especially useful in between operating on patients if the patient is having their eyes done close together where there is not sufficient gap to warrant or justify a clinic appointment. Photography is not just confined to the anterior segment. For retinal imaging, researchers at the Massachusetts Eye and Ear Hospital recently developed a simple technique of fundus photography using an iPhone, an imaging app called Filmic Pro and a 20 D lens with or without a Koeppel lens. Apps may also play an important role in helping ophthalmologists deal with ever-increasing patient numbers as populations grow older and existing services are stretched to breaking point. More ophthalmologists will switch to using customized apps for more efficient patient management and follow-up. Growth is expected in everything that connects patients to clinics and enables them to administer tests off-site such as macular and glaucoma screening using secure applications. One such application already gaining traction in the market is AppVisit, which uses the power of mobile devices to connect doctors and their patients for virtual “visits” using a secure communications platform. The demand for such applications is sure to increase as ophthalmologists seek to make more efficient use of their time and resources .

AppVisit’s co-developer, Dr. Harvey A Fishman MD, PhD, an ophthalmologist in private practice in Palo Alto, California, emphasized that AppVisit is not a replacement for one-on-one consultations, but rather a way for practitioners to manage their existing patients more efficiently. “What the app does is provide the opportunity to triage much more effectively and to treat many of the routine, low-level cases that simply don’t need to be seen in person every time. Patients can take a visual acuity test, use an Amsler grid (for macular degeneration and other detection), snap a picture of their eye and send all that information along with exam questions via AppVisit. If the patient has blepharitis or conjunctivitis and has been seen regularly from month to month, the app enables the doctor to monitor their progress, prescribe or alter treatment and, if necessary, call them in for an office consultation,” he said. To those who raise concerns about such virtual consultations, Dr. Fishman points out that worldwide, there are an estimated one billion phone calls per year (200 million in the US alone) already involve clinicians or nurse practitioners conducting medicine on the phone.