

Commentary: Is it time for teleophthalmology, virtual glaucoma clinics and uberization of eye care?

Ever since the invention of the telephone by Alexander Graham Bell in 1876, people have found uses for it in various aspects of life. In fact, doctors were perhaps one of the earliest professionals who were required to have a telephone, and be “on call” for emergencies. One of the earliest references to the telephone in medical journals was in “The Lancet” in the form of a “Letter to the Editor” by “A.B.M” from Hornsey.^[1] This smart person put forth an interesting suggestion that perhaps the telephone could be used for auscultation and also to study muscle contraction. F.H. Sanders from Cheyne-Walk suggested the superiority of the telephone over the stethoscope.^[1] The invention of the electric stethoscope in 1910 further helped advance this field of medicine and after several decades of rapid technological progress, we now have smartphones with internet connectivity as almost a necessity of daily life. Several innovators have found uses for smartphones in medical diagnosis and care.

COVID-19 and the Rise of Telemedicine

Even though telemedicine had been ready on the technology front for several years, it was not really popular with doctors or patients for several reasons. The doctor-patient interaction in telemedicine is undeniably restricted and examination is not possible without a doctor’s assistant at the patient’s side. Even medicolegal laws were not fully amenable to routine teleconsultation. But with COVID-19 and the lockdown, it became necessary to use telemedicine on a large scale. The Indian Ministry of Health and Family Welfare, quickly updated the rules to allow smooth functioning of telemedicine. Many doctors and patients who were previously not comfortable with computers and video-consultation learnt to use teleconsultation due to a lack of other safe options. Some hospitals even made sure to keep it interesting by gamifying the otherwise tiring work of teleconsultation by allotting teams and scores.^[2]

Telemedicine and Teleophthalmology

Even though telemedicine is great for certain branches of medicine where history of symptoms and a gross visual examination would help in diagnosis, ophthalmology often requires specialized equipment for examination and diagnosis. An ideal teleophthalmology setup would have an ophthalmic assistant with vision charts, slit-lamp microscope with camera, fundus camera, and a method for intraocular pressure measurement. This might be in a vision center or a mobile teleophthalmology unit. But in these desperate times, teleconsultation had to be done with the patient at home without any specialized ophthalmic equipment or ophthalmic personnel.

In the accompanying article, the authors studied 621 teleconsultation calls over a 2-month period in the beginning of the lockdown.^[3] We find that the most common subspecialty referenced was cornea, followed by retina, cataract, glaucoma, and pediatric ophthalmology. Note that almost 50% was medication related with 9% being for change of a glaucoma medication. This shows us that even without teleophthalmology equipment, home teleconsultation itself has a lot of potential.

Frugal Indovation in Teleophthalmology

Being India, people look for innovative, low-cost solutions for every problem. There are several smartphone apps^[4] such as Peek Acuity and Eye Handbook which can help in vision testing over teleconsultation. This includes visual acuity, color vision, contrast sensitivity, and even stereopsis testing in some specialized apps. Anterior segment photography can be done using smartphones with good macro modes and is helped by placing a clip-on lens or an intraocular lens placed in front of the camera.^[5] Fundus photography usually requires lenses, but Chrisan D Gunasekera and Peter Thomas demonstrated that fundus can be visualized with only an iPhone X without any special lenses or modifications as would be the case in teleconsultation with the patient at home.^[6] This entire history of fundus examination from candlelight to direct ophthalmoscope to indirect to slit-lamp to smartphone with adapters to lenses and without lenses is quite an interesting story.^[7] Amar Pujari *et al.* from All India Institute of Medical Sciences took this even further by making a panoramic montage photograph of the retina of a child with retinoblastoma using only an iPhone XS Max without any lenses or modifications.^[8] Portable and affordable Virtual Reality Perimeters are now available from various companies.^[9] Gonioscopy can be photographed on smartphone.^[10] All these innovations can potentially be utilized in teleconsultation.

Uberization of Eye Care

With pace of modern life, we are perhaps moving towards a state of expecting maximum convenience helped by technology. Uberization of Healthcare is a hotly debated topic with proponents both for and against this neo-euphemism in the medical field. Uberization in Eye Care might mean that patients can book home appointments with a teleophthalmology service that would bring all the required ophthalmic equipment to their home along with an ophthalmic technician for maximum convenience. The convenience gained and time saved by the patient would be enormous, and perhaps rapidly grow this business model when the time is right.

Virtual Glaucoma Clinic (VGC)

Glaucoma is a chronic disease requiring life-long follow-up, and so a few of the visits have been conducted via Virtual Glaucoma Clinics in the National Health Service of the United Kingdom. There are actually physical clinics in the Hospital Eye Service (HES) units which are manned by nurses and nonmedical staff so that the ophthalmologists and glaucoma specialists can spend their time more efficiently doing surgeries and reviewing complicated cases. In addition to collecting data on the patient’s history including medication compliance, they check visual acuity, intraocular pressure, do a slit-lamp examination with photographs, gonioscopy, visual field test, and Optical Coherence Tomography (OCT). The data is later reviewed by an ophthalmologist. This service is used for glaucoma patients whose disease is stable and are at low risk of developing significant visual loss.

Teleophthalmology in the Future

The future would perhaps bring about efficient Uberization of Eye Care with universal access to healthcare becoming a basic human right. Electronic Medical Records may be linked

to Aadhaar Card hopefully with good security and privacy features.^[11] Virtual Ophthalmic Clinics may become a norm and may be manned, not by humans, but by robots and Artificial Intelligence.^[12] Incremental innovations may allow affordable medical devices that may even fly out to the patient in drones.

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References

1. Aronson SH. The Lancet on the telephone 1876-1975. *Med Hist* 1977;21:69-87.
2. Akkara JD, Kuriakose A. Commentary: Gamifying teleconsultation during COVID-19 lockdown. *Indian J Ophthalmol* 2020;68:1013-4.
3. Ravindran M, Segi A, Mohideen S, Allapitchai F, Rengappa R. Impact of teleophthalmology during COVID-19 lockdown in a tertiary care center in South India *Indian J Ophthalmol* 2021;69:714-8.
4. Akkara J, Kuriakose A. Innovative smartphone apps for ophthalmologists. *Kerala J Ophthalmol* 2018;30:138-44.
5. Akkara JD, Kuriakose A. Commentary: The glued intraocular lens smartphone microscope. *Indian J Ophthalmol* 2019;67:1692.
6. Gunasekera CD, Thomas P. High-resolution direct ophthalmoscopy with an unmodified iPhone X. *JAMA Ophthalmol* 2019;137:212-3.
7. Akkara JD, Kuriakose A. Commentary: Seeing the big picture: Panoramic smartphone fundus imaging sans accessories. *Indian J Ophthalmol* 2019;67:949-50.
8. Pujari A, Lomi N, Goel S, Yadav S, Mukhija R, Kumar P, *et al.* Unmodified iPhone XS Max for fundus montage imaging in cases of retinoblastoma. *Indian J Ophthalmol* 2019;67:948-9.
9. Kuriakose A, Akkara JD. Evolution of virtual reality perimetry in visual field analysis. *Bengal Ophthalmic J* 2019;46:8-11.
10. Kumar N, Francesco B, Sharma A. Smartphone-based gonio-imaging: A novel addition to glaucoma screening tools. *J Glaucoma* 2019;28:e149-50.
11. Akkara JD, Kuriakose A. Commentary: Teleophthalmology and electronic medical records: Weighing the pros and cons of unavoidable progress. *Indian J Ophthalmol* 2020;68:367-8.
12. Akkara JD, Kuriakose A. Role of artificial intelligence and machine learning in ophthalmology. *Kerala J Ophthalmol* 2019;31:150.

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