Commentary: What the eye sees, Let's make the world see - Smart evolution of teleophthalmology

Though telemedicine as a concept is not new, it has proved to be game-changing in ophthalmology, especially in the post-COVID era. While it has played a significant role in reaching out to remote areas across different regions, it has grown leaps and bounds in the recent past. It has helped convert large geographical areas to smaller territories. To add to its strengths, several innovations and novelties have dragged our attention and made it to the limelight, making the whole system more practical and accessible.

The launch of e-Sanjeevani: A novel teleophthalmology platform

Launched during the COVID-19 pandemic, the e-Sanjeevani platform provides multifaceted benefits. As observed by the authors, there is a myriad of benefits and specific challenges in the field of ophthalmology. Under the Ayushman Bharat scheme of the Government of India, e-Sanjeevani is the first successful attempt at digitalizing health care in the country.[1] Currently, this platform encapsulates a team of one lakh doctors and paramedics and over one crore consultations done in core specialities like medicine, obstetrics and gynecology, psychiatry, dermatology, orthopedics, and ophthalmology.[2]

The authors of the accompanying article have elaborated well on the spectrum of patients seeking treatment for ocular complaints via e-Sanjeevani.[3] As noted by the authors, the vast majority of common anterior segment pathologies have been successfully managed via teleconsultations. It is relevant to mention here that anterior segment photos (using a smartphone camera) at the site aided the diagnosis via teleconsultations in most cases. A provisional diagnosis could not be reached in only less than 10% of cases. The main strength of teleophthalmology lies in the ability to take standard eye care to the primary and secondary health centre level, which is lacking in most states. The provision for video conferencing with the doctor in real-time is an added benefit that may be utilized increasingly in the coming years.

The challenges and roadblocks with the e-Sanjeevani platform

However, it is prudent to highlight two significant challenges this platform must overcome. First and foremost, the success of telemedicine rests mainly on infrastructure. Many rural areas have yet to receive the digital revolution's benefits, despite India's booming telecom network.[2,4] Another primordial observation made by the authors is poor network connectivity as a hurdle.[3] Second, due to the unavailability of a fundus camera, the lacunae in posterior segment examination may prove to be a significant limiting factor to the success of e-Sanjeevani. Evaluation of the fundus is often overlooked in the rural setting, and incorporating this into this platform will be a significant boon. Numerous authors have cited low-cost do-it-yourself fundus imaging with smartphones.[5,6] This is where such an innovation may be game-changing.

The cost-effective way forward with new additives to teleophthalmology

Since outreach services are quite financially burdening, sending experts for such programs becomes a daunting task. Hence, doctors or health care workers (HCWs) of junior cadres are mostly sought for these services. While they are exposed to a newer domain, most often the process of learning remains incomplete. This is primarily due to the gap between what they see and their inability to express it to their peers and seniors. To bridge the gap, a recent innovation called the Anterior Segment Photography with an Intraocular Lens (ASPI) by Gosalia *et al*.[7] yields detailed and high-quality images that can be used by residents and HCWs alike in storing and learning from them. A similar smartphone technology for fundus capture was the Trash to Treasure (T3) Retcam invented by Chandrakanth *et al*.[5]

IOL scope is a game-changing innovation in visualizing the microorganisms implicated in corneal ulcers.[8] It can reduce the delay caused by the transport of the sample and avoid unnecessary contamination in the chain of custody.[9] This also aids in quick opinion from microbiological experts across renowned institutes, which can significantly reduce the patient's morbidity through timely intervention.

Smart record-keeping and cloud-based system documentation

Registering and capturing details regarding a patient's condition was never a simple task in the earlier days in teleophthalmology, even with reasonable connectivity. But lately, the teleophthalmological document has witnessed a few innovations in this area, starting with simple smartphone photography to document images of grossly visible lesions. Akkara *et al*.[10] described simple methods and gadgets to facilitate slit lamp photography and videography, which can

be maintained well in a cloud-based system for easier access later by people across the state.

Better documentation, better communication

Lastly, documentation of the findings on a virtual platform can help prevent data loss, ensure timely expert opinions, and deliver appropriate services to the patients at the point of care. The new in-vogue with augmented reality and fascinating holograms designed by Ramesh et al. can be a vital tool in documenting the various ocular pathologies encountered at the point of care.[11,12] With its simple and easy-to-use interface, it can be a five-finger exercise for healthcare workers to use the technology on a routine basis. It can also be a great teaching tool for young minds to understand the anatomic intricacies of the eye and how they are altered with different diseases.

Conclusion

To conclude, teleophthalmology has been booming beyond perceptible limits in the recent past. It shall continue to open new frontiers in taking eye care to the nooks and corners of this country. While it has its own set of drawbacks and challenges, multiple efforts are being made by researchers and enthusiasts from all spheres to overcome it cost-effectively. Thus, embracing them as we grow both individually and as a fraternity in the future is necessary. On that note, e-Sanjeevani is a step forward in the right direction, providing teleophthalmology with a much-needed boost.

Prasanna Venkatesh Ramesh,
Anujeet Paul[1], Shruthy Vaishali Ramesh[2],
Niranjan Karthik Senthil Kumar[3]

Medical Officer, Department of Glaucoma and Research, Mahathma Eye Hospital Private Limited, Trichy, Tamil Nadu, [1]Fellow, B B Eye Foundation, Kolkata, West Bengal, [2]Medical Officer, Department of Cataract and Refractive Surgery, Mahathma Eye Hospital Private Limited, Trichy, Tamil Nadu, [3]Fellow, Department of Comprehensive Ophthalmology, Nirmal Eye Hospital, Tambaram, Chennai, Tamil Nadu, India

Correspondence to: Dr. Prasanna Venkatesh Ramesh, Mahathma Eye Hospital Private Limited, No. 6, Seshapuram, Tennur, Trichy – 620 017, Tamil Nadu, India.
E-mail: email2prajann@gmail.com

References

1. Kasthuri A. Challenges to healthcare in India-The five A's. Indian J Community Med 2018;43:141-3.

2. Sood S, Bhatia J. Development of telemedicine technology in India: "Sanjeevani"-An integrated telemedicine application. J Postgrad Med 2005;51:308-11.

3. Markan A, Kishore A, Agarwal A, Akella M, Singh A, Goyal S, *et al*. Demographic profile of patients seeking teleophthalmology consultations through e-Sanjeevani: Retrospective analysis of 5138 patients from North India. Indian J Ophthalmol 2022;70:4238-43.

4. Dash S, Aarthy R, Mohan V. Telemedicine during COVID-19 in India-A new policy and its challenges. J Public Health Policy 2021;42:501-9.

5. Chandrakanth P, Ravichandran R, Nischal NG, Subhashini M. Trash to treasure Retcam. Indian J Ophthalmol 2019;67:541-4.

6. Maamari RN, Keenan JD, Fletcher DA, Margolis TP. A mobile phone-based retinal camera for portable wide field imaging. Br J Ophthalmol 2014;98:438-41.

7. Gosalia H, Chandrakanth P, Verghese S, Narendran K, Narendran V. Anterior segment photography with intraocular lens (ASPI) – An innovative resident education tool. Indian J Ophthalmol 2022;70:1060-63.

8. Chandrakanth P, Chandrakanth K. Smartphone-based intraocular lens microscope. Indian J Ophthalmol 2020;68:2213.

9. Chandrakanth P, Ramesh PV, Janakiram TN, Ramesh SV, Aji K, Chandrakanth KS, *et al*. Innovative intra-operative rapid detection test for visualisation of mucor. Indian J Ophthalmol 2021;69:2844-5.

10. Akkara J, Kuriakose A. How-to guide for smartphone slit-lamp imaging. Kerala J Ophthalmol 2019;31:64-71.

11. Ramesh P, Devadas A, Joshua T, Ray P, Ramesh S, Raj P, *et al*. Eye MG 3D application-A comprehensive ocular anatomy and pathophysiology 3D atlas with real-time true color confocal images to enhance ophthalmology education and e-Counseling. Indian J Ophthalmol 2022;70:1388-94.

12. Ramesh PV, Joshua T, Ray P, Devadas AK, Raj PM, Ramesh SV, *et al*. Holographic Elysium of a 4D ophthalmic anatomical and pathological metaverse with extended reality/mixed reality. Indian J Ophthalmol 2022;70:3116-21.