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Commentary

Tele-Refraction in Tele-Eye Care Settings: A Commentary

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ABSTRACT

Uncorrected refractive errors are the leading cause of visual impairment globally. The access to primary eye care, which includes refraction, is limited by the lack of refractionists and the remoteness of certain populations. Remote refraction could be a promising way to address this issue. There are two types of remote refraction: web-based refraction testing and clinical tele-refraction. Online refraction is the use of web-based tools or devices that allow for subjective refractive measurements. This type of remote refraction is unassisted, while clinical tele-refraction involves an in-person technician, or professional, and a remote eye care provider in a synchronous, asynchronous or hybrid modality. Studies have found that both online refraction and clinical tele-refraction can be equivalent to in-person subjective refraction. Tele-refraction also appears to have an excellent ability to fully address eye complaints for uncorrected refractive errors and presbyopia. Tele-eye care is evolving quickly and more studies on remote refraction are still needed to safely outline its role and to precise clinical guidelines. In order to provide comprehensive primary eye care examinations remotely instead of being limited to refractive-only or disease-specific screening, further research in the remote assessment of binocular vision and ocular health are also necessary.

Keywords: Refraction; Refractive errors; Tele-eye care; Tele-ophthalmology, Tele-optometry; Tele-refraction

DESCRIPTION

Subjective refraction is a vital part of comprehensive primary eye care since it allows Eye Care Providers (ECP) to properly assess the best corrected visual acuity of patients and prescribe an optical correction. Uncorrected Refractive Errors (URE) can impact the quality of life of ametropes, but also the global economy due to productivity loss [1]. Unfortunately, URE still constitute the leading cause of visual impairment globally, even though they are avoidable and treatable disabilities [2]. Up to now, in-person refraction has been standard of care for screening and management of URE, but the lack of refractionists throughout the world is resulting in a growing tendency toward tele-eye care [3]. While some patients, who already have access to in-person primary eye care, use remote refraction because it appears to them as more convenient, others seek such alternative due to the inaccessibility of proper in-person eye care. Web-based refraction measurement and clinical tele-refraction are now part of the equation and may also be part of the solution to address global visual impairment.

Various models of online refraction are now available in certain parts of the world. Some only measure visual acuity to validate the actual spectacle prescription, while others are used as an alternative to an in-person subjective refraction (MR) in order to provide spectacle prescriptions to patients. Web-based testing tools or devices are used without assistance and outside of clinical settings, which is an advantage from a logistical and human resources standpoint since it does not require any on-site operator training and allows ECP to do an asynchronous review of data before prescribing. Tousignant et al. [4] found that using an unassisted smartphone-based MR could result in suboptimal outcomes in terms of visual acuity and comfort compared to performing the same smartphone-based MR with a technician. However, another web-based refraction tool was found to be as valid and safe as in-person MR in healthy eyes [5]. The same tool was inferior to MR in keratoconus eyes, which emphasizes the importance of validation to properly pinpoint what type of patients should be using specific models of web-based refraction [6]. Another aspect to consider is that online refraction may mislead patients into believing that they received a

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comprehensive eye exam even though such testing is often performed without binocular vision and ocular health assessment. On the matter, the American Optometric Association states that: "fragmentation of a comprehensive eye exam into components delivered independently is deleterious and deceptive to patients" [7].

Clinical tele-refraction is another way to measure refraction remotely. It requires on-site assistance by a technician, or another professional, and must take place in a clinical setting. The remote ECP can make a store and forward or a real-time review of data to prescribe spectacles. In the present scoping review, Blais et al. identified interesting models of tele-refraction that include real-time MR controlled remotely with digital phoropters through video-conferencing [8]. Three studies found great agreement between remotely controlled tele-refraction and in-person MR [9-11]. One more study concluded that another remotely performed MR had an excellent ability to fully address eye complaints of patients for URE and presbyopia without the necessity of in-person visits [12].

To aim at the worldwide eradication of visual impairment caused by URE in an efficient and timely manner, the modality through which refraction should be performed and managed must be questioned and potentially redefined. In fact, even the standard of care in subjective refraction might be updated, since new technologies of MR, such as self-refraction and hybridization of objective and subjective refraction, are proven to provide accurate measurements while improving refraction time and repeatability compared to traditional MR [13]. Of course, the actual clinical standard in terms of modality remains unchanged so far, since the in-person delivery of eye care allows for a stronger doctor-patient relationship. However, as stated by the Canadian Association of Optometrists, when barriers to in-person care exist, such as the COVID-19 pandemic, the lack of refractionists or the remoteness of certain populations, "tele-optometry provides an essential mechanism for continued provision of eye care" [14].

CONCLUSION

The actual burden of URE worldwide needs to be addressed as soon as possible, and various interesting remote refraction options could prevent visual impairment. Tele-eye care is evolving quickly and more studies on remote MR are still needed to safely outline its role and to specify clinical guidelines. In order to provide comprehensive primary eye care examinations remotely, instead of being limited to refractive-only or disease-specific screening, further research in the remote assessment of binocular vision and ocular health are also necessary.

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