

Internet-Based Video Visual Acuity Testing During COVID-19

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Since the outbreak of COVID-19 a shift toward remote consultation has become necessary. I describe my experience with this technique that seems reasonably accurate with the application Zoom® a 4-meter calibrated logMAR ETDRS-type visual acuity chart along with a PC laptop (in my case Hewlett-Packard EliteBook 745 G3) equipped with built in webcam and audio capability. The patient has a smartphone that is capable of landscape format screen-viewing and all devices are compatible with Zoom® over sufficient internet connection.

A PubMed search using the search terms visual acuity test AND video OR web OR internet OR Skype® OR Zoom® returned no similar reports of published articles. A search of the internet in general revealed a number of commercially driven websites offering a 'Tumbling E' format (uncrowded) visual acuity test but the outcome is reported only as pass/fail.

The tester (healthcare practitioner) begins by downloading and registering to use Zoom which is free, encrypted and the software has the capacity to record the consultation (mutual consent required). The tester adds the testee to their Contacts in Zoom®, an invitation is sent to the testee's email with a hyperlink to click just when ready to start the consultation. The logMAR chart is positioned as close as possible within the viewable frame of the webcam of the PC such that the 1.0 and the -0.1 logMAR line are visible (typically 95 - 100 cm from PC webcam). When a live Zoom-link is established the testee orientates their smartphone in landscape position wearing their BCVA (including presbyopic component) and acuity testing conducted as normal observing for peeking etc. This technique essentially converts a distance high contrast visual acuity test to a near visual acuity test.

This technique was used to test 3 patients (1 meibomian cyst - P1, 1 floppy eyelid review - P2 and 1 postoperative strabismus surgery - P3) and 2 staff members (1 presbyopic emmetrope - N1 and 1 emmetrope with unilateral amblyopia - N2). Verbal consent to use data for the purpose of this report was obtained in each case, the Zoom consultation was encrypted (small green lock symbol in the top left hand corner of the window) and only the patient was emailed the link to the videoconsult just before the scheduled start. Zoom meetings were not recorded and this was explicitly stated. Acuties recorded from the previously untested, reportedly emmetropic P1 were 0.1 logMAR each eye (iPhone 8). The best corrected visual acuity (BCVA) for P2 from 2 weeks pre-op was R 0.2, L 0.1 logMAR during face-face and with Zoom consult 2 weeks after bilateral adjustable squint surgery R 0.1, L 0.16 (iPhone 7s). P3's unaided (UA) acuties face-face 3 months prior were R 0.3 (UA), 0.22 (PH), L 0.02 (UA) and at review with Zoom was R 0.1 (UA), L-0.02 (UA) with Huawei P30 pro smartphone. He reported a 70% improvement in discomfort of his more affected right eyelid entropion.

Intervention/disease could influence acuity in these patients of course so tests were conducted on staff members using firstly Zoom VA via iPhone 6s and then repeated a few minutes later on a different letter-sequence ETDRS chart of equal design. N1 was a presbyope who wore spectacles for the Zoom VA but was UA for the face-face VA. The Zoom VAs were R 0.26, L 0.1 logMAR and face-face VA was R 0.2, L 0.0 logMAR. N2 was a non-presbyopic, right amblyope with Zoom VA of R 0.3, L 0.08 logMAR and face-face VA of R 0.44, L 0.12 logMAR. Moving the smartphone closer or further away from the subject's face did not make any subjective difference to the visibility of the 1.0 logMAR letters and a screenshot of the ETDRS chart on this iPhone 6S resulted in a screen image that was reasonably clear and each letter on the 1.0 logMAR line had on-screen dimensions 5mm x 5mm with a limb width of 1 mm.

This short report on the feasibility of an internet-based video visual acuity technique is helpful in advance of a carefully controlled study that should take into account variables such as type of smartphone, viewing distance, associated ocular co-morbidity, test-retest variability and each (tester and testee's) participant's adeptness at using technology of this type. Cautions using Zoom or any videoconsultation platform relate to confidentiality since either party could share the hyperlink allowing those with whom they shared it to also view the consult. The videoconsult can be recorded on Zoom (with mutual consent). In summary it appears Zoom videochat software is a feasible technique and reasonably accurate for measuring visual acuity provided that presbyopes wear their spectacle correction for near and the tester's webcam is moved close enough to the ETDRS chart to just include the 1.0 and the -0.1 logMAR lines and the smartphone is held in landscape orientation.

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