Evaluating Heru, Inc. Virtual Reality Technology as a Visual Field Diagnostic Tool

Margaret Tharp[1]; Louis Cantor[1]; Brandon Jacobs[2]; Kathryn Haider[1]; John Lind[1]
[1]Indiana University School of Medicine, Department of Ophthalmology
[2]Indiana University School of Medicine

Purpose: This study evaluated the clinical accuracy of the Heru, Inc. virtual reality (HVR) headset relative to the Humphrey Visual Field Analyzer (HFA). Secondary goals included independent product evaluation of HVR utility and limitations and consideration of how this technology can be used in various clinical scenarios where perimetry capabilities are limited.

Methods: Participants were tested with HFA and HVR at one appointment with order of testing by each device randomized to the extent possible based largely on clinic schedule. 9 patients were tested with HFA before and 15 patients with HFA after HVR testing. Patient age, mean deviation (MD), pattern standard deviation (PSD), numerical chart values, and test duration were recorded. Average HVR test time was measured externally by a stopwatch due to the unreliability of time reported by the device. Average HFA test time was determined from machine output. Data were organized and analyzed in Microsoft Excel using paired t-tests and descriptive statistics.

Results: 45 eyes of 24 patients were included, 24 right (OD) and 21 left (OS). The average age was 67.8±11.9 years. The average absolute difference between HFA and HVR for MD and PSD, was found to be 2.22 and 1.71 dB OD and 1.61 and 1.36 dB OS, respectively. 17/24 (71%) and 12/21 (57%) of MD values and 16/24 (67%) and 13/21 (63%) of PSD values for OD and OS, respectively, were found to be greater when measured with HVR than with HFA. No statistically significant difference was found between MD (p=0.06 OD, 0.48 OS) and PSD (p=0.28 OD, 0.67 OS). The VF defects observed were qualitatively similar between the HVR and HVR. The average test time per eye (min:sec) was 6:46 for the HVR and 3:06 for the HVF ($p=5.63x10^{-15}$).

Conclusions: The HVR can be utilized in settings in which the HFA cannot, such as emergency departments or mobile clinics, and has lower up-front costs, thereby potentially improving access to visual screening technology for populations with otherwise limited resources. These results show no statistically significant differences between HFA and HVR MD and PSD. Testing duration, software reliability, and internet connection can be limiting for the HVR relative to the HFA. Small sample size is a limiting factor in this study. Further analysis of individual sectors of the VF can be performed to ensure those differences are also not significant quantitatively.