

CONTROL ID: 2689017

SUBMISSION ROLE: Abstract Submission

AUTHORS

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Commercial Relationships Disclosure (Abstract): Patrick Li: Commercial Relationship: Code N (No Commercial Relationship) | Tyson Kim: Commercial Relationship(s);Cellscope Retina:Code P (Patent) | Jose Davila: Commercial Relationship: Code N (No Commercial Relationship) | John Gosbee: Commercial Relationship: Code N (No Commercial Relationship) | Yannis Paulus: Commercial Relationship: Code N (No Commercial Relationship)

Study Group: Multidisciplinary Ophthalmic Imaging Group

ABSTRACT

TITLE: Usability testing of a smartphone-based retinal camera among new users in the primary care setting

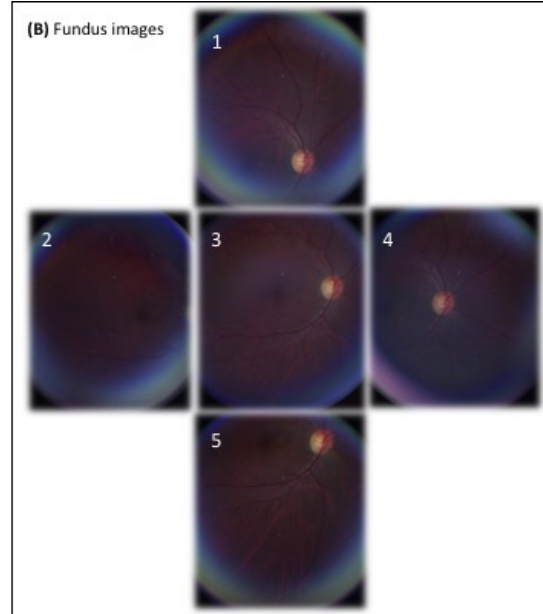
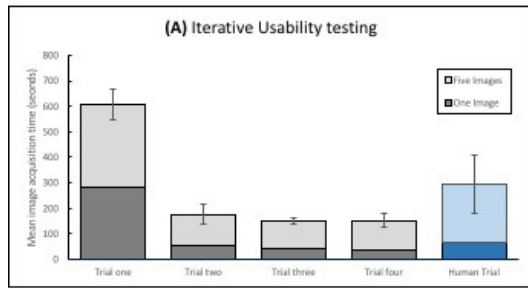
ABSTRACT BODY:

Purpose: Primary care clinic based diabetic retinopathy (DR) screening is a potential solution to improve the low national DR screening rates, but is limited by the high cost, bulky nature, and specialized training required of traditional table-top retinal cameras. Smartphone-based retinal photography can help address these limitations. The goal of this study is to improve the usability of a smartphone-based retinal camera, CellScope Retina, among medical staff who are inexperienced with retinal imaging.

Methods: 24 medical assistants and technicians were recruited for a total of 4 rounds of usability testing. Participants were given a 1-minute tutorial on how the smartphone-based retinal camera worked, and then asked to capture photos from 5 fields of the retina of a model eye. The duration of image acquisition was documented. Software, hardware, and instructional modifications were made after each round of testing in accordance with user feedback. Afterwards, a proof-of-concept test was performed on the dilated eye of a human volunteer. An IRB exemption for this study was granted due to no direct patient involvement.

Results: There was an overall decrease in average image capture time after each round (Trial 1: 260 ± 60 seconds for 1 image, 325 ± 60 seconds for 5 images; Trial 2: 55 ± 20 seconds for 1 image, 121 ± 41 seconds for 5 images; Trial 3: 43 ± 16 seconds for 1 image, 108 ± 13 for 5 images; Trial 4: 34 ± 17 seconds for 1 image, 119 ± 26 seconds for 5 images; Human trial: 66 ± 7 seconds for 1 image, 229 ± 114 for 5 images).

Conclusions: CellScope Retina allows medical assistants who are naïve to retinal photography to rapidly (in < 1 minute) acquire a high quality photograph of the retina. Afterward, a test performed on a human eye demonstrated clear images with only a small increase in imaging time. Usability testing is a rapid, high-yield approach for feedback-driven improvements of smartphone-based retinal photography among inexperienced users. Additional testing with human subjects is needed for further improvements.



(A) The following modifications were made after each trial: After trial 1, improved instructions; after trial 2, improved application graphic user interface (GUI); after trial 3, improved device ergonomics and illumination with further GUI modification. (B) 1-superior, 2-temporal, 3-central, 4-nasal, and 5-inferior views of human retina captured by naïve user

DETAILS

PRESENTATION TYPE: #1 Poster, #2 Paper : Travel Award Applicant

CURRENT REVIEWING CODE: 2530 imaging: new technologies and techniques - MOI

CURRENT SECTION: Multidisciplinary Ophthalmic Imaging Cross-sectional Group

Clinical Trial Registration (Abstract): No

Other Registry Site (Abstract): (none)

Registration Number (Abstract): (none)

Date Trial was Registered (MM/DD/YYYY) (Abstract): (none)

Date Trial Began (MM/DD/YYYY) (Abstract): (none)

Grant Support (Abstract): Yes

Support Detail (Abstract): University of Michigan Center for Entrepreneurship Dean's Engineering Translational Prototype Research Fund, University of Michigan Translational Research and Commercialization for Life Sciences (MTRAC) Grant # N021025, and University of Michigan Department of Ophthalmology and Visual Sciences Department Support

TRAVEL GRANTS and AWARDS APPLICATIONS

AWARDS: ARVO and ARVO Foundation Travel Grants|ARVO Members-in-Training Outstanding Poster Award|Grant Wood Balkema Memorial|Knights Templar Eye Foundation (US)|ARVO Foundation (US)|National Eye Institute (NEI)|Retina Research Foundation (RRF)|Santen Inc.

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