

MOBILE OPHTHALMOLOGY

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ABSTRACT

Background: Telemedicine is delivery of medical information and services b existing telecommunication technologies.

Research question: What are the applications of smart phones in teleophthalmology?

Method: Review of existing literature

Results: Currently there are a number of smart phone applications for use in the field of ophthalmology, including visual acuity and color vision testing, pupil gauge and accommodation targets.

Conclusions: Smart phones and their applications give an unparalled mobility to the ophthalmologist and his team.

Keywords: *smart phones, teleophthalmology, mobile phone*

Background: The potential applications and usefulness of smart phones in the medical field is expanding and evolving every day. In the last decade there was enormous increase in development and improvement of mobile phones hardware and software. With their evolution smart phones have become an aspect of our everyday life. On average one out of every two physicians use a smart mobile phone, and this number is expected to increase. Research shows that more than 81% of physicians in the USA use smart phones in 2012. [1, 2] Medicine and ophthalmology as a subfield have also benefited greatly from them. [2, 3] A survey of the ASCRS (American Society of Cataract and Refractive Surgeons) shows that 83% of ophthalmologist use smart phones to accomplish their professional responsibilities. Daily new application are released that offer improvements in mobility and efficiency of ophthalmological examination, better access and management of patient and physician data and education, as well as a large database and a reference tool for medical researchers. [6]

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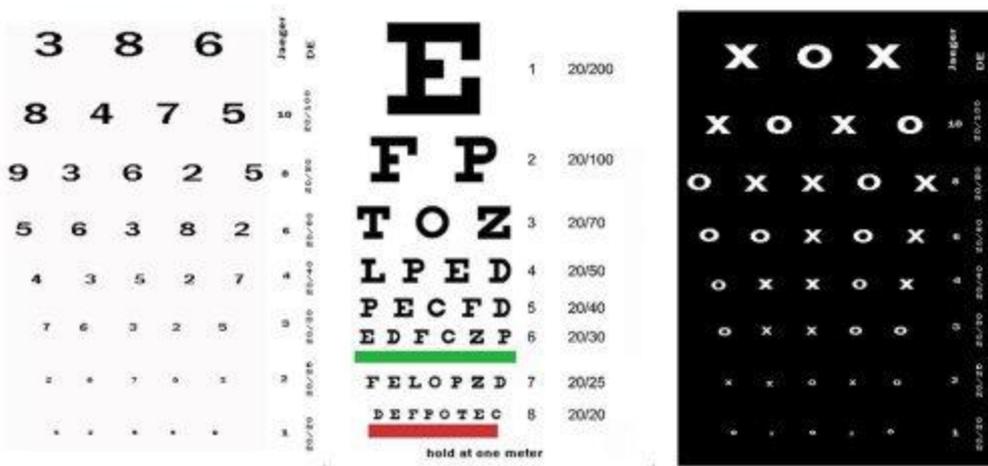
Results: In the following article we aim to categorize and describe various potentially useful applications for smart phones. Existing applications can be put into one of several categories: [7]

1. Testing tools
2. Patient education tools
3. Physician reference tools
4. Physician education tools
5. Calculators and other office based tools

Testing tools include: near vision cards (could be used as an alternative to standard near vision cards and when other means for visual acuity testing are not available) [Table 1], color vision plates (they do not age, color do not fade away and are readily available anywhere as a replacement for standard color tables) [Table 2], pupil gauge (quick access measuring device, usable in any setting) [Table 3], Fluorescein light (for emergency situations where slit lamp examination is not possible) [Table 4], Pediatric fixation target (accompanied by sound and motion), Worth 4 dot and

accommodation targets (for non-office test situations), Amsler grid (for patients with suspected macular disease) [Table 5], Pediatric optotypes, red desaturation test. [8-10]

Table 1



Near Vision Card

Inverted Card

Table 2

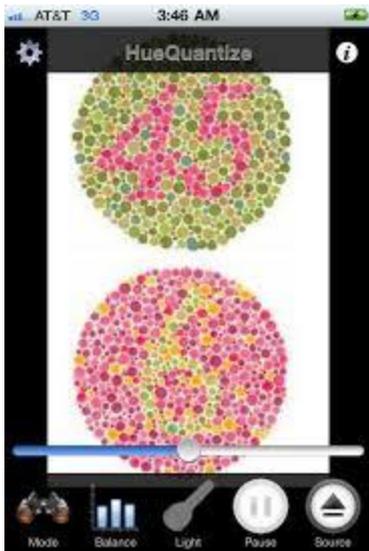


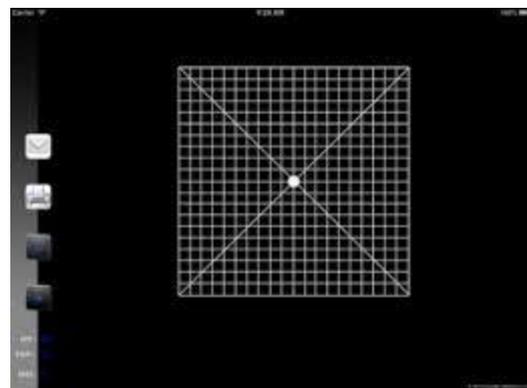
Table 3



Table 4



Table 5



Smart phones offer application for every medical field, but the nature of ophthalmology makes prime candidate for such applications. When patients are examined in non-ideal conditions these “apps” offer an indispensable alternative to standard examination techniques, that can be done with increased ease and efficiency.

Patient education usually includes written, visual or verbal materials aimed at improving the patients understanding of medical conditions. Standard tools for patient education are brochures, pamphlets and video materials. The most popular application for patient education include the Eye handbook, IKONION and iPatientEd. [8,11]

These applications provide a vast database with information for the most common eye conditions. Included are the clinical features and treatment methods as well as sites with further information on the topic. The information is presented in layman’s terms and does not require any prior medial education to understand.

Physician reference tools: The larger part of smart phone usage is for personal communication, but increasingly physicians are using them as reference tools. Between 30 -40 % of physicians are reporting using their smart phones for clinical decision support. Using smart phones during clinical examination allow the physician to “engage” the patient (e.g. taken photos can be shown and discussed with him) at the same time smartphone-based collection of clinically-relevant data will help patients become their own data collectors. This may abstract away the mundane and standardize the unreliable aspects of the physical exam, and allow for trending data that needs to be taken in context and not just at once-yearly visits (e.g. blood pressure, temperature, etc). [12]

Physician education: applications provide ophthalmogist with visual data with changes in the eye in different diseases, summary of different trials and questionnaires for the most common diseases. [13, 14] There are a large number of physician educational applications including atlases, clinical courses, diagnostic and treatment guidelines.

Calculators and other office based tools: these include a number of useful office applications such as glaucoma risk calculator, back vertex distance calculator, and an IOL calculator, amongst others.

Conclusions: The increasing distribution of Smartphone "apps" in ophthalmology may have the potential to facilitate patient treatment, data management and communication

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