PHOTOSCREENING FOR REFRACTIVE ERROR AND STRABISMUS USING GoCheckKids™ SMARTPHONE APP

OBJECTIVE
To detect risk factors for amblyopia using a smartphone app.

INTRODUCTION
Approximately 13% of children aged 3 to 5 have visual problems that can hinder normal visual development. Preschool vision screening is essential to detect amblyopia, strabismus, and other vision disorders before loss of vision or visual acuity becomes irreversible. Amblyopia is the most common cause of visual impairment in children, affecting as many as 5% of preschool children. Amblyopia is a central nervous system disorder in which the vision in one or both eyes is reduced because the eye and brain are not working together properly. Despite general agreement that it is important to screen preschool children for amblyopia risk factors and refer vision-impaired children, 60% of pre-kindergarten children in the United States were not screened as of 2006. Amblyopia and other ocular problems go undetected in preschool children, especially in low-income families with reduced access to regular pediatric care. Unscreened vision problems create a social and economic burden in lost productivity and increased medical costs.

The American Academy of Pediatrics, American Academy of Ophthalmology, and American Optometric Association have issued guidelines for vision screening in children. However, few providers are equipped with the resources needed for vision screening.}

METHODS
Institutional Review Board (IRB) consent was obtained to screen 23 children using the GoCheckKids app (Gobiquity Inc., Portland, OR) using an iPhone5. The GoCheckKids screenings were performed at the Albina Head Start in Portland, Oregon on February 15, 2013 by experienced vision screening staff from the Elks Children’s Eye Clinic. Vision Screening Program. The GoCheckKids app takes standardized flash photographs at a target working distance of 24 inches in 2 modes (portrait and landscape). Reflection is measured using corneal width, pupil diameter, and corneal diameter from the 2 photographs according to the eccentric photo reflection principle. Strabismus was measured by the position of corneal reflex relative to the pupil and cornea. Photoscreening were performed in a dimly lit room prior to cycloplegic eye drops.

RESULTS
Out of 23 study subjects, 4 children (17%) were excluded from analysis due to poor photographic quality. Three were causing glare, and 1 had small pupils. Of the remaining 19 subjects, 7 were referred for clinical examination: 5 for amblyopia, 1 for myopia, and 1 for esotropia. Comprehensive dilated eye examinations were conducted at the Head Start schools on a different day than vision screenings. They included VA test, a cover test, examination of the anterior and posterior ocular segments, and a cycloplegic retinoscopy. Ocular abnormality by examination was defined by the following criteria: hyperopia, spherical equivalent (SE) ≥ + 2.0 D; astigmatism, cylinder ≥ 1.0 D, myopia, SE < - 3.0 D, anisometropia, SE ≥ 1.0 D (difference in SE); amblyopia suspect 2-4 acute difference, acuity, anisometropia, moderate astigmatism, moderate hyperopia, abnormal anterior posterior segment exam, ptosis, or strabismus. Of the six kids referred by both GoCheckKids criteria and clinical criteria, the diagnosis agreed in 5 of the 6 cases.

CONCLUSION
Photoscreening using Smartphone could be an effective method of detecting risk factors for amblyopia. However, further refinement of the algorithm is required to maintain both high sensitivity and specificity. Further research is needed to validate the screening process. The GoCheckKids app provides a simple, cost-effective, and easy-to-use tool for early detection of visual impairment in young children.

REFERENCES

FURTHER INFORMATION
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Ophthalmologists, optometrists, and medical staff and students performed these eye exams during their clinical rotation with particular regard to patient care and automation. Automatic quality assurance is an effective method of detecting risk factors for visual impairment in children. Amblyopia is the most common cause of visual impairment in children, affecting as many as 5% of preschool children. Amblyopia is a central nervous system disorder in which the vision in one or both eyes is reduced because the eye and brain are not working together properly. Despite general agreement that it is important to screen preschool children for amblyopia risk factors and refer vision-impaired children, 60% of pre-kindergarten children in the United States were not screened as of 2006. Amblyopia and other ocular problems go undetected in preschool children, especially in low-income families with reduced access to regular pediatric care. Unscreened vision problems create a social and economic burden in lost productivity and increased medical costs.

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