

SMARTPHONE-GUIDED CLINICAL ALGORITHMS

Development & validation for use by community volunteers in a rural eye health programme in Kenya

IN BRIEF

Researchers have developed a smartphone app which allows non-specialist community volunteers in Kenya to accurately identify and refer patients to eye care services almost as effectively as an experienced eye health professional.

This [peer-reviewed study](#) demonstrates that smartphone apps developed in this way could help to free up scarce specialist eye health resources, making eye health programmes more effective and better value for money.

STUDY TITLE

Smartphone-Guided Algorithms for Use by Community Volunteers to Screen and Refer People With Eye Problems in Trans Nzoia County, Kenya: development & validation

CITATION & LINK TO FULL STUDY

[JMIR Mhealth Uhealth 2020;8\(6\):e16345](#)

Study method

The decision-guiding app was developed and tested in an eye health screening programme in Trans Nzoia county, Kenya. The researchers compared the effectiveness of referral decisions for people being screened for eye health issues in their homes made by community volunteers using the app to those of an experienced Ophthalmic Clinical Officer.



Smartphones have the potential to greatly increase access to eye health care in remote and rural areas where specialist resources are scarce. Photo: Peek Vision



Specialist eye care is scarce in many low- and middle-income countries. Finding innovative ways to increase capacity is vital to address the huge unmet need for eye health.

Photo: Peek Vision

Key findings

The team developed a smartphone app which used questions about a person's age, eye symptoms and signs, plus distance and near vision tests, as criteria for making a decision on whether to refer them for further examination.

Once the app had been fine-tuned, community volunteers' decisions agreed with those of an eye health specialist at least 80% of the time.

In the final iteration, community volunteers' positive decisions (to refer an individual for further examination or treatment) agreed with the experienced ophthalmic clinical officer in almost 9 out of 10 cases. Community volunteers' negative decisions (that a patient did not need to be referred for further treatment) agreed with the experienced ophthalmic clinical officer in over 8 out of 10 cases.



“This app could provide a way to increase the capacity of eye health services by allowing community volunteers or other non-specialists to accurately refer people for further treatment.”

Dr Hillary Rono, lead author of the study

In context

Specialist eye health resources are very scarce in many low- and middle-income countries. For example, in Kenya, there are around three ophthalmologists per million people and ten allied ophthalmic personnel (e.g. ophthalmic nurses) per million people. Moreover, specialist eye health resources tend to be concentrated in urban areas, meaning eye health is even harder to access for rural populations.

The app developed in this study provides a way to effectively increase the capacity of specialist eye health workers by allowing community volunteers or other non-specialist personnel to accurately refer people for further treatment.

A further advantage is that the app can provide clear data on referrals and their outcomes, allowing programmes to be closely monitored and adjusted if needed.

Limitations

Around one in ten people identified by the community volunteers were false positives (i.e. the community volunteers referred people for further examination who were not referred by the specialist). This might raise some concerns about overburdening services which are already under pressure.

However, the vast majority (81%) of false positive referrals using the app were from participants self-reporting eye discomfort or poor eyesight, whereas only 7% of false positives were because of inaccurate vision assessment.

These findings suggest that the false positive rate could be greatly reduced if community volunteers receive training in basic history taking and examination.

Additionally, the ophthalmic clinical officer (OCO) used as the reference standard in this study is unique to a small number of countries, so the results may not be generalisable to other countries where this role does not exist. However, the iterative design of the decision-making algorithm means that the study should be replicable with different, locally-appropriate roles as reference standard.

Next steps

The app is not yet available commercially. However, the research is being used to inform further developments of Peek Vision's technology-based solutions to help eye health services in low- and middle-income countries.

Collaborators

The study was done by a team of researchers from the [International Centre for Eye Health \(ICEH\)](#) at [London School of Hygiene & Tropical Medicine \(LSHTM\)](#), [Kitale County and Referral Hospital](#) in Kenya and [Peek Vision](#), a social enterprise based in Botswana, Kenya and the UK.

Lead author Dr Hillary Rono is an Ophthalmologist at Kitale Eye Hospital, Kenya, a researcher at the International Centre for Eye Health at London School of Hygiene & Tropical Medicine, and Kenya lead for Peek Vision.

ABOUT PEEK

Peek Vision powers eye health organisations with technology-enabled tools & processes to improve how they deliver care. The result is better eye health for the millions of people worldwide who need it.



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