CASE STUDY

HEALTH

Reporting Rapid Diagnostic Test Results in Zimbabwe

Processing RDTs on mobile phones for improved diagnosis of malaria and HIV/AIDS in rural clinics

PROJECT OVERVIEW

With support from Econet Wireless and the Zimbabwean Ministry of Health, Global Solutions for Infectious Diseases (GSID) created a mobile system with Dimagi and ODK Diagnostics to better process rapid diagnostic tests for HIV and malaria. The system utilizes CommCare's case management and reporting features to digitize health workers' workloads, and ODK-Dx's ability to process, analyze, and return RDT results with computer vision algorithms.

At a Glance

Implemented: Zimbabwe, 2013

Sectors: Malaria & HIV/AIDS

Features: Data collection, automatic reporting, RDT capturing & analysis, health worker supervision, & process adherence

Number of users: 60

BACKGROUND

In 2013, 14.7% of people in Zimbabwe were HIV-positive and 50% were at risk of contracting malaria (UNAIDS, WHO). Malaria misdiagnoses are common in areas without laboratories, since diagnosis is based on patients' symptoms that are not unique to malaria. With frequent misdiagnosis and drug resistance on the rise, improving diagnosis accuracy is crucial to treat and prevent malaria and curb the spread of HIV infections.

In response to this growing public health crisis, GSID, ODK Diagnostics and Dimagi created a mobile application to process rapid diagnostic tests (RDT) in rural clinics. RDTs have been shown to alleviate many HIV and malaria treatment barriers due to faster, more cost-effective, and accurate diagnosis. In Zimbabwe, HIV and malaria testing is often carried out in outpatient clinics by health workers, many of who have received only basic RDT training.

BRINGING TOGETHER COMMCARE AND ODK-DX

In order to reduce these challenges, GSID decided to adopt a mobile system to better monitor diseases and process RDTs for HIV and malaria. After considering a number of different mobile platforms, GSID chose CommCare based on its reputation, flexibility, open source code, and location-mapping capabilities. GSID also chose to integrate the system with ODK Diagnostics (ODK-Dx), which is able to process images of RDTs. This resulted in a mobile application capable of photographing and analyzing an RDT to determine positive or negative test results for malaria and HIV, in addition to helping both health workers and supervisors track and manage patients' cases.

The integration of CommCare and ODK-Dx seeks to:

- Provide a digital job aid to guide health workers in accurately administering RDTs
- Automatically analyze and deliver RDT results to health workers and program staff
- Automate data collection and eliminate key sources of errors
- Reduce health workers' workload by digitizing paperwork
- Enable high-level supervision of health workers' RDT administration

HOW THE SYSTEM WORKS

In GSID's system, CommCare is used as the primary application on the mobile phone to capture a patient's basic details such as the date, location, test type, disease type, patient gender, and patient age. CommCare then loads the diagnostic application from ODK-Dx to take photographs

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of the RDT and analyze its results. ODK-Dx immediately returns the results and uploads the images to the CommCare app, which are saved on the CommCareHQ server.

This flow enables the application to capture a nurse's visual reading of the RDT onsite and compare it with an automatic reading generated by ODK-Dx itself.
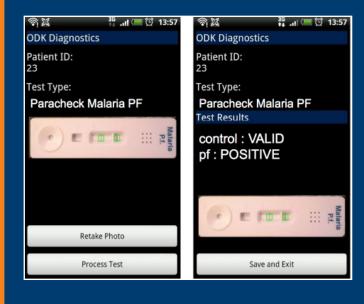
IMPLEMENTATION PHASE

In October 2013, a pilot was implemented in Manicaland Province, including one provincial hospital, two district hospitals and two rural health centers. These sites were selected primarily for their potential of malaria incidence during the study period. Dimagi and ODK-Dx staff trained 60 nurses to use the application in both English and the local language, Shona, over the course of ten training sessions. During this training, an instructor trained each group of nurses to use the

Feature Spotlight

Rapid Diagnostic Tests (RDT) Processor

In order to reduce the rate of misdiagnoses, this mHealth system instructs the health worker to perform both a visual analaysis and a photo analysis of RDT results. This consists of the health worker completing an RDT, performing a visual reading of the RDT's results, and inputting the test results into CommCare. They will then also run a photo analysis by placing the RDT on a stand and taking a photo of it with their phone. ODK-Dx reads the test results through the photo and comes up with a diagnostics screen (see image to the right).

If both the visual results and the photo results match, CommCare determines that the test has a "valid result", and instructs the health worker to save and close the form. If the two tests do not match, CommCare deems an "invalid result", and in the app's next version, will instruct the health worker to redo the test again until they have a valid result.

mobile application and take accurate photos of RDTs. Nurses also completed a practice test. The study lasted for about two months, during which GSID staff monitored incoming data to ensure nurses' correct use of the application. The pilot concluded with presentations to stakeholders from the Ministry of Health and EcoNet to assess the overall effectiveness of the application as an mHealth intervention.

SHARING PHONES AMONG CLINICAL NURSES

Unlike most CommCare projects where each user receives their own phone, in the GSID project, multiple nurses in one clinic share a phone depending on who is on duty. During the pilot, 60 nurses shared 15 phones. Each phone was given a unique login for the CommCare application. This enabled multiple users to access CommCare on one phone, and gives supervisors the ability to monitor individual locations and hospital departments' performance through CommCare reports.

RESULTS AND EVALUATION

Early evaluations show that CommCare can help real-time reporting of RDT results. GSID used images uploaded to CommCareHQ to identify whether nurses were performing RDTs incorrectly (such as using too

much solution or applying too much blood to the receptor). This data enabled the central lab to effectively monitor nurses' test administration, and identify issues in data collection practices. Early results also suggest that users can quickly and easily incorporate an mHealth application into their existing workflow without major disruptions. During the pilot phase, nurses continued to collect data with paper forms in addition to using the mobile application. As GSID begins a formal evaluation of how the system impacted malaria and HIV testing, the large-scale deployment will switch over to using only mobile applications to reduce nurses' workload.

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