A tablet-based clinical management tool: building technology for Ebola Management Centres

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Background

In Sierra Leone, during the West Africa Ebola outbreak, MSF operated Ebola Management Centres (EMCs), where clinicians wear hot, heavy personal protective equipment (PPE) in the high-risk zone (HRZ). Clinical data capture involved shouting over the fence to colleagues in the low-risk zone who recorded data by hand. Google Crisis Response, MSF, and volunteers from the open-source community developed a tablet-based clinical management tool for use in the HRZ with the aim of improving the efficiency and quality of data collection, allowing clinicians to spend more time providing care while in protective equipment.

Project

Development started in October 2014 and deployment in January 2015. Challenges included limited power supply, unreliable internet connectivity, high-risk infection control, and low vision and dexterity in PPE. The team developed a tiny (2x2cm) local server with no moving parts and low power consumption, and a local network. Waterproof off-the-shelf tablets were ruggedized with a custom-built, chlorine-resistant enclosure and wireless charging, and a patient-management dashboard with an OpenMRS back end. The devices synchronized via the local server, removing dependency on internet access. Information entered was accessible by all tablets. Running such a system on such small, low-power, ergonomically adapted hardware and self-contained dependencies has never been achieved in the field before. The system was piloted in two EMCs and implemented in the EMC in Magburaka, Sierra Leone. No patient data were shared with Google; during an implementation visit, a Google employee did see and interact with staff and patients. All hardware and software developed has been placed under an open-source license, and the handover of maintenance from Google to an open-source steering committee including MSF representatives is ongoing. No formal comparison of the tablet with the paper-based system was conducted due to reduction in patients in 2015.

Outcomes/lessons learned

Initial findings suggest the system facilitated efficient clinical work in the HRZ. Clinical staff reported the tablet enabled more reliable, easier, and faster observations. Development of such tools is resource-intensive and takes time. To begin development once a crisis is already underway risks not being able to implement in time to improve outcomes, though if properly managed is more likely to result in tools useful for later crises. The key lesson is the need for close collaboration between technologists and operational humanitarians as neither have the requisite skills and knowledge to produce field-robust solutions alone.

Conclusions

This innovative tablet-based electronic clinical management system was developed for the challenging environment of a high risk EMC by a team of technologists and humanitarians. Running such a system on small, low-power, ergonomically adapted hardware and self-contained dependencies has never been achieved in the field before. The system itself will likely improve the quality, quantity and timeliness of clinical data capture, and will be adapted to other settings where data collection and longitudinal tracking of patient data are important.