Provider Alerts and Reminders to Improve Tuberculosis Care Among PLHIV: Designing for Digital Innovation in Kenya

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Background

People living with HIV (PLHIV) have a 20-fold higher risk of dying from tuberculosis (TB). In rural Kenya, a recent audit of autopsies from HIV-positive patients showed that approximately 25% of deaths were due to TB. A substantial body of literature now confirms that isoniazid preventive therapy (IPT) reduces overall TB incidence. In response to mounting evidence, the WHO now recommends IPT for all asymptomatic patients. However, it is estimated that among 33 million PLHIV worldwide, only 1.7 million (5%) were screened for TB and about 85,000 (0.2%) were offered IPT (WHO 2010).

The TB Tech project aims to design, develop, implement, and evaluate information and communication technologies to improve TB care among PLHIV in western Kenya. This multi-stage study takes place within the AMPATH network of clinics in western Kenya. The formative stage of this study is currently underway.

Methods

Human-centered design of global health technology

Human-centered design (HCD) has been used by innovators in private industry and technology for decades. It’s a process for gaining insight into the needs of the ultimate beneficiaries of your innovation, creating innovative approaches to meet these needs, and delivering solutions that work in specific socioeconomic contexts. HCD is an approach that emphasizes the engagement of end-users and other key stakeholders in the design and implementation of innovation solutions. TB Tech Kenya used the following 3-step HCD process (see also Fig. 1):

- Hear through the collection & analysis of site observation sessions (n=9), key informant interviews (n=23), and in-context usability surveys (n=24).
- Create an alert/reminder system to improve provider’s integration of TB intensified case-finding & isoniazid preventive therapy (IPT) initiation into HIV care. During this phase, a team of Kenyan TB clinicians, global health technology engineers, and health researchers collaborated over 6 months to translate the mixed methods learnings (from the Hear Stage) and experiential knowledge of end-users engaged in the design process into frameworks, opportunities, solutions, and prototypes.
- Deliver: our TB alert/reminder system to 3 pilot sites for usability testing and iterative development. And, now across a network of 24 clinics in Western Kenya (Sept 2013).

FIGURE 1: IDEO, HCD Toolkit. 2012

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Results

Alert & reminder system for the integration of TB prevention & treatment into HIV care

Through the analysis of qualitative and quantitative data, several key themes emerged for the design and development of a TB reminders system for HIV providers:

1) More than just a prompt, TB alert/reminder messages have to be educational and instructive;
2) TB messages have to be varied, even if they are conveying the same underline message, so as to avoid being overly repetitive and losing providers’ attention;
3) TB messages have to address providers attitudes about initiating IPT, mainly fear about resistance developing due to drug stock-outs;
4) Although any patient living with HIV is eligible for IPT, reminders should focus on the high priority patients, including those who have been newly admitted into care and people with other TB patients in their household; and

5) Reminders must be based on timely and accurate patient data, which particularly requires addressing data quality and integration problems for patient radiology data, laboratory data, and pharmacy data.

Based on this understanding and consultation with clinicians who would be the beneficiaries of our innovation, our team created several iteratively refined prototype systems. The final system design is depicted in Fig. 2.

First, the provider writes patient information on a paper encounter form at the point-of-care while conducting a patient exam as usual. When computer hardware becomes accessible and acceptable in medical offices, this information will be entered directly into the patient electronic medical record. Second, a data entry team inputs paper encounter forms into the OpenMRS electronic medical record system. Third, we use approved algorithms for TB prevention and care to produce patient-specific tailored reminder messages for providers. Before the patient’s next scheduled visit, the alert/reminders are delivered to providers through the most reliable and feasible means: paper. Our system produces individualized & tailored reminders, to be printed on a clinical summary sheet & placed in the patient paper file—the only means to ensure that these messages are seen exactly when providers need them and in a medium that is acceptable and accessible regardless of access to digital hardware, internet networks, and power at the point-of-care.

In testing the usability of this system, providers reported that reminders were very understandable, with a mean rating of 5 (on a scale of 1-5). Similarly, they found the reminders to be important, with a mean score of 4.24. Lower scores were given to helpfulness at 3.65 and practicality/feasibility at 3.41. When we probed about lower scores, providers told us that despite knowing what to do, access to chest x-ray equipment and results was still the most insurmountable barrier to initiating IPT. Within this AMPATH clinical network, chest x-ray is required to rule-out active TB, in addition to the WHO recommended steps.

Conclusions

Human-centered design facilitates digital innovation in resource-constrained settings. Using this approach, our team improved our understanding of the needs and assets of providers in a low-resource HIV care context, created a TB alert/reminder system to improve intensive case-finding and IPT initiation among patients living with HIV, and implemented the system among 3 pilot sites and then an extensive network of 24 HIV clinics in Western Kenya. As leaders of HIV programs worldwide introduce innovative digital solutions, techniques in human-centered design can facilitate the process of developing and using mHealth and eHealth tools to address complex problems.

References


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