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A Mobile Health Approach to Tuberculosis Contact Tracing in Resource-Limited Settings

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Abstract and Objective

Tuberculosis remains a leading cause of morbidity and mortality worldwide. In 2011, there were 8.7 million new cases and 1.4 million deaths from the disease, with >95% of these deaths taking place in low- and middle-income countries [1]. Contact tracing prevents the spread of tuberculosis by identifying and screening a case's contacts and referring symptomatic individuals to health care providers. Traditionally, contact tracing has been conducted with paper forms, which can lead to considerable inefficiencies in data collection, storage, and retrieval. These inefficiencies are problematic as tuberculosis can continue to spread if disruption of disease transmission is delayed. Mobile health approaches to tuberculosis contact tracing remain largely unaddressed and limited to management and monitoring of multidrug-resistant tuberculosis [2].To address these limitations, a mobile health application that digitizes and automates contact tracing was developed. This poster presents work currently underway to evaluate this new approach in Botswana, which has the tenth highest incidence rate of tuberculosis in the world [3]. Operational considerations for implementing a mobile health approach to contact tracing in resource-limited settings are also presented.

Keywords: Tuberculosis, contact tracing, mobile health

Methods

This study will make use of retrospective and prospective designs to evaluate a mobile health approach to tuberculosis contact tracing in Botswana.

In the first phase of the study, the mobile health approach will be compared to the paper form-based approach. Specifically, the time required from start of data collection to report generation, the quality of data collected and entered into the contact tracing data base (e.g., missing values, illogical values), and the monetary costs of conducting contact tracing will be compared. For the paper form-based approach, data will be collected retrospectively for the 6 months preceding its replacement with the mobile health approach in September 2012. Prospective data collection for the mobile health approach began in September 2012 and will continue for 6 months.

For the second phase, the acceptability and usability of the mobile health application will be assessed following the conclusion of the 6 months of prospective data collection. The Computer System Usability Questionnaire will be administered to a team of healthcare workers that operates as a unit to conduct contact tracing and members of the national tuberculosis program who make regular use of contact tracing data. Additionally, geographic coordinates of cases' homes captured with the mobile health application will be used to generate case density maps and determine whether disease hotspots can be identified at the household level.

In the third and final phase, operational considerations for implementing a mobile health approach to contact tracing in resource-limited settings will be reviewed and summarized.

Results

Preliminary results indicate that the mobile health approach to tuberculosis contact tracing in Botswana eliminates the need for manual data entry into the contact tracing data base. Additionally, the mobile health application requires all form fields to be completed electronically prior to submission, automatically generates weekly and cumulative reports, and accurately captures the geographic coordinates of cases' homes. With this new approach, data submission is reliant upon the availability of the 3G network.

Conclusion

In resource-limited settings, conducting tuberculosis contact tracing with paper forms can lead to considerable inefficiencies in data collection, storage, and retrieval. This study will assess a mobile health approach to contact tracing in Botswana and present operational considerations for implementing this new method in resource-limited settings.

References

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