Monitoring Patient Compliance with Tuberculosis Treatment Regimes in Pakistan

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Sector(s): Santé

Location: Pakistan

Target group: Urban population

Outcome of interest: Communicable diseases Social service delivery Tuberculosis

Intervention type: Commitment devices Digital and mobile Health care delivery Nudges and reminders

AEA RCT registration number: AEARCTR-0002336

Données: Download data set from Dataverse

Research Papers: Impact of a Daily SMS Medication Reminder System on Tuberculosis Treatment Outc...

Partner organization(s): Interactive Research and Development, International Initiative for Impact Evaluation (3ie)

Policy issue

Tuberculosis is a persistent global health challenge. In 2015 there were an estimated 10.4 million new tuberculosis (TB) cases worldwide and an estimated 1.8 million TB-related deaths.[1], More than 95 percent of TB cases and deaths are in low-income countries.[2], Tuberculosis is a treatable and curable disease, but adhering to the six to nine month treatment regimen can be difficult for patients with limited access to information, medical supervision, or support. Without proper treatment, transmission of the disease continues, and 45 percent of HIV-negative people and nearly all HIV-positive people with TB will die.[3], Partial adherence to treatment can also lead to development of drug-resistant tuberculosis.[4]

The rapid uptake of mobile phones in low- and middle-income countries over the past decade has provided public health programs unprecedented access to patients. While some programs have tried sending automated text message reminders to patients to improve medication adherence, there is limited rigorous evidence on the impact of text message reminders on tuberculosis treatment outcomes.

Context of the evaluation

Pakistan is one of six countries that, together, accounted for more than 60 percent of new TB cases worldwide in 2015.[5], Pakistan also has a relatively high rate of treatment success, with 93 percent of cases successfully treated (compared to a global average of 83 percent).[6], However, approximately 510,000 new TB cases emerge every year in Pakistan, and it is estimated to have the fourth highest prevalence of multi-drug-resistant TB globally.[7] Multi-drug-resistant TB is caused in part by patients' failure to comply with the full TB drug treatment regimen; the high rates of this type of TB in Pakistan suggest that compliance is a serious

problem in this context.

In this study, researchers worked with Interactive Research and Development (IRD), who developed and implemented the system being evaluated, and private and public health clinics in the city of Karachi, to improve TB patient compliance with drug treatment regimens.

Participants in the study were 15 years of age or older, newly diagnosed with TB, already had access to a mobile phone, and intended to live in Karachi throughout their TB treatment.



Pharmacist in Pakistan reaching for medication from stocked shelves.

Photo Credit: UmairQasim, Shutterstock.com

Details of the intervention

The Zindagi SMS system is a two-way, daily medication reminder system for TB patients developed by the informatics team IRD in Pakistan.

In this double-blind randomized evaluation, the research team invited TB patients of health clinics in Karachi to enroll in the Zindagi SMS system. Of the 2,207 people who volunteered to enroll, researchers randomly selected half to receive text message reminders, with the other half serving as a comparison group with no text messages.

Once a patient was enrolled, the system sent daily SMS reminders scheduled at a time that the patient specified during enrollment. The messages included a motivational message followed by a reminder to patients to reply via SMS to indicate that

they have taken their medication.

For example, one reminder message said, "Your health is in your hands. Take your medication and remember to respond by SMS or a missed call." Messages were sent in Urdu using English script. (Based on feedback from an initial pilot, TB was not explicitly mentioned in the messages due to stigma.) Participants were offered PKR 60 (US$0.60) per month to cover the cost of responding.

Messages were sent every day throughout the full duration of patients' treatment. If a patient did not reply, additional reminders were sent, and the research team would follow up to confirm that the messages were being received.

Researchers conducted an initial survey, monthly surveys during the intervention, and a final survey of all participants. The evaluation began in March 2011 and enrollment continued on a rolling basis until February 2014. Final surveys were completed in November 2014. Survey questions covered self-reported medication adherence, treatment outcomes, and self-reported psychological and physical health.

Results and policy lessons

Results indicate that SMS reminders had no impact on treatment success. Variables like gender, quality of care, and access to a mobile phone did not affect outcomes.

Response rates: The system was successfully implemented 79 percent of the time. Missed days were largely due to system failures, administrative shortfalls, or network outages.

Of participants who were sent messages, 85 percent responded at least once. Over the course of treatment, average response rates fell from 48 percent in the first two weeks to 20-24 percent in the last two weeks.

Prevalence of Tuberculosis: There were no significant differences in clinic-reported treatment outcomes between participants in the Zindagi SMS group and the comparison group.

In addition, researchers collected 1,001 sputum samples from patients (499 from the SMS group and 502 from the comparison group) and tested for the presence of tuberculosis bacteria; there was no difference in sputum results between the two groups.

There were also no significant differences in self-reported medication adherence or psychological and physical health.

Researchers hypothesized that the SMS reminders, intended to combat forgetfulness, did not sufficiently address underlying factors that contribute to patients leaving treatment. Researchers noted that their null results were similar to findings of other recent studies that suggest frequent reminders are ineffective, possibly because it is difficult to pay attention to very frequent messages.[8]

It is possible that longer intervals between messages, greater off-site support for remote patients, or coupling SMS messages with financial incentives may better motivate patients to complete treatment successfully.

Use of results

Based on these results, IRD decided not to scale up the program. Instead, they are testing SMS reminders to patients of specific dates on the immunization schedule (which are infrequent and irregular and thus harder to remember), and linking reminders to incentives to complete treatment.

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2. WHO. 2017. Tuberculosis Fact Sheet. https://www.who.int/en/news-room/fact-sheets/detail/tuberculosis.
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4. Volmink J, Garner P. Directly observed therapy for treating tuberculosis. Cochrane Database Syst Rev 2007; 4: CD003343. https://www.ncbi.nlm.nih.gov/pubmed/17943789.
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7. WHO. 2015. “Stop Tuberculosis: Pakistan.” http://www.emro.who.int/pak/programmes/stop-tuberculosis.html.
8. See references section of full paper for links to systematic reviews of text message reminders for medication adherence.