FEASIBILITY AND ACCEPTABILITY OF MOBILE SMS REMINDERS AS A STRATEGY TO IMPROVE DRUGS' ADHERENCE IN TB PATIENTS

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ABSTRACT

Background: Tuberculosis (TB) treatment adherence remains a challenge. Mobile text messaging has the potential to improve patients' compliance with TB treatment, but acceptability and feasibility of this strategy has not been evaluated in our set-up.

Objective: To study the acceptability and feasibility of SMS-reminder in patients taking anti-TB drugs.

Methods: It was a randomized controlled trial, conducted from June 2014 to June 2015, in two centres: Khyber Teaching Hospital Peshawar and Emergency Satellite Hospital Nahaqi. Patients enrolled for anti-TB drugs were distributed in intervention and control groups; daily mobile SMS reminders (intervention) were sent to patients of intervention group during initial 2 months of treatment (on top of usual DOTS). Feasibility was assessed at the time of enrolment of patients and acceptability of SMS-reminders was assessed by semi-structured questionnaire based interview after 2 months of anti-TB treatment.

Results: One hundred and forty-eight (148) patients were enrolled: 74 patients in each group; the demographics of both groups were comparable: Study was found to be feasible to conduct, as all patients had access to SMS reminders: either via personal mobile phones (94% of male patients) or via one of their family members (81% female patients). Most of the patients found it acceptable and helpful and were feeling good about it. Only 2.7% patients were not feeling good about SMS reminders, as they were unable to understand the message.

Conclusion: We found SMS-intervention feasible and acceptable for participants in our set-up.

Key Words: Tuberculosis; Tuberculosis treatment; Compliance; Default Rate;Mobile phone; SMS;Text messages.

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INTRODUCTION

Tuberculosis is amongst the major health problems worldwide. Pakistan ranks at 5th position according to the burden of this disease.[1] After starting a patient on anti-TB treatment, its vital to ensure regular drugs taking by uninterrupted provision of drugs, managing for side-effects of these drugs, and even psychological and social support. Therefore, WHO recommends directly observed treatment short course (DOTS) strategy to achieve desirable results of TB treatment worldwide.[2,3]

Poor compliance with anti-TB drugs results in many worse consequences which include: prolonged time

duration of infectious stage of TB,[4] high relapse rate after treatment,[5] resistance to anti-TB drugs,[6,7] expensive treatment regimens for prolonged duration with less reported efficacy[8] and finally, increased morbidity and mortality.[4] Therefore it is essential to devise strategies to improve patients' compliance with anti-TB drugs and overcome the above-mentioned issues.

Mobile phone is the most commonly used technology of communication worldwide. Mobile text message, known as SMS (Short Messaging Service) is being used in healthcare systems. This is called mobile health (mHealth).[9,10] Barriers of long distances are successfully eliminated by mHealth.[11] It has been successfully used for improving drugs compliance with anti-HIV drugs.[12] SMS can be sent on daily or weekly basis.[13,14] We studied the acceptability and feasibility of SMS as a reminder tool in our patients taking anti-TB drugs in DOTS program.

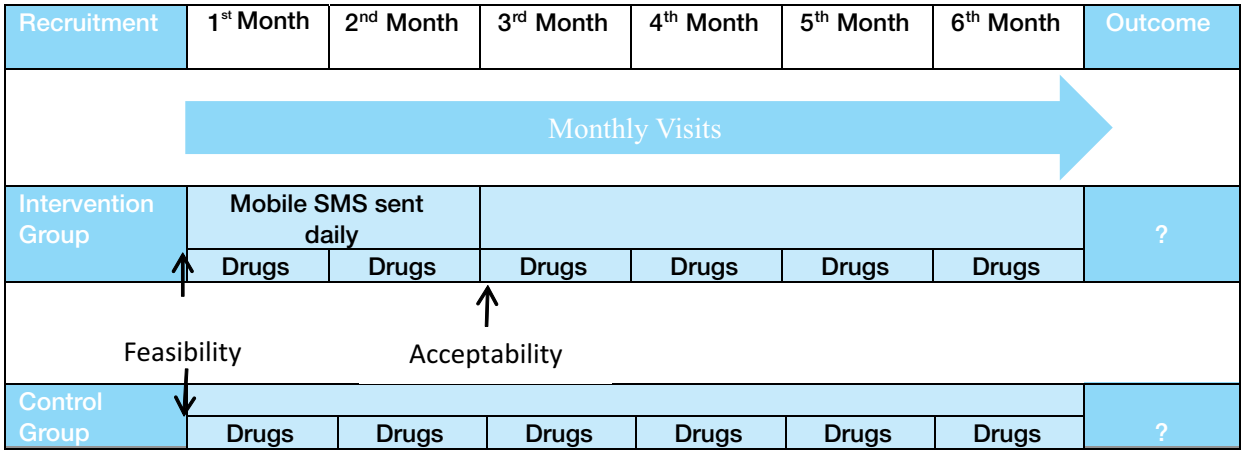
METHODOLOGY

This study was conducted from June 2014 to June 2015 on TB patients registered in TB Clinics of Khyber Teaching Hospital (KTH) and Emergency Satellite Hospital (ESH) Nahaqi. The objective of this study was to evaluate the feasibility and acceptability of daily SMS-reminders in patients taking anti-TB drugs in DOTS program. All new cases of pulmonary and extra pulmonary tuberculosis registered in TB control program having a mobile or access to mobile phone were included in the study. Following patients were excluded from the study: those having no access to mobile phone, those with visual problems, those physically unable to handle mobile phone, those with category-II treatment (relapse and treatment failure cases), and those with meningeal, miliary and abdominal TB.

Enrolled patients were divided into two groups by simple randomization method (on 1:1 ratio): interventional and control. As an intervention, mobile SMS-reminders were sent daily to patients during intensive phase (initial 2 months) of anti-TB treatment in the intervention group but not in the control group. Feasibility was measured at the start of anti-TB treatment by identifying the number of potentially eligible participants and the number of patients with cell phones in both groups and compared. Acceptability was evaluated at the end of intensive phase (initial 2 months) of anti-TB treatment in intervention group (Figure-1).

The data was planned to be collected through interview technique using pretested structured questionnaire. Special mobile phone SMS package was taken to deliver the reminder message. Research assistants were identified to collect data. They were medical technologists working in the two above-mentioned TB clinics. Training sessions were arranged for these research assistants in which they were educated on study aims and objectives, questionnaire was discussed with them, and they were practically trained how to collect and enter data in the given questionnaire. Questionnaire was pretested on patients in TB Clinic of KTH and necessary changes were made as required. The required sample of 148 was divided into two (intervention and control) groups, 74 patients in each group, by random assignment using the computer-generated numbers. These randomly assigned numbers were sealed in envelopes to remain confidential. Study was conducted among new TB patients, who were registered in TB control program for anti-TB drugs. Patients fulfilling the inclusion criteria were identified and study was introduced to them. In case of willing patients and absence of exclusion criteria, informed consent (verbal/written) was obtained and they were enrolled in the study.

Figure 1: Study protocol



On first visit, the basic demographic data was recorded in the questionnaire. It included age, gender, education in years, weight of the participants, disease status, sputum smear result, contact person and understanding of mobile phone message. Feasibility was measured on first visit and acceptability was evaluated at the end of intensive phase of anti-TB treatment. Participants in the intervention group were educated for understanding SMS text message. The SMS comprised two components: a) message in Urdu language saying "You are suffering from tuberculosis, please take your anti TB drugs daily on empty stomach", and b) an illustrated figure showing "hand carrying tablets" for illiterate patients.

The sample size was calculated using WHO sample size calculator for random control study. Reported patient default rate is 19%; no such study is available to report that patient default is improve by mobile SMS text message, therefore p was taken 0.20, and 0.10 with 95% confidence interval, the margin of error being (0.05). The sample size was calculated to be 148, estimating the non-responders at 10%. Each group comprised 74 patients.

Data was analysed by standard statistical formula using statistical package (SPSS 19 version). Descriptive statistics like percentage, mean and standard deviation (SD) were calculated for variables like sex, age and education status. Chi-square test was used for comparative analysis of phones availability between male and female patients in the intervention group to assess feasibility of study. At 95% confidence limit, p value <0.05 was labelled as significant.

RESULTS

Total of 148 patients were enrolled, 74 in each group. Mean age of the patients was 29.4 $\pm$ 17.6 years. Eighty-eight (59.5%) were enrolled in KTH and 60 (40.5%0 in ESH. The demographics of both groups were comparable (Table-1).

Feasibility: Study was found to be feasible to conduct as all patients had access to SMS reminders either via personal mobile phones or via one of the family members (Figure-2): Majority (i.e. 94%) of male patients had their personal mobile phones whereas majority (81%) of female patients had an access through one of their family members (p <0.01). Thus female patients are mostly dependent on their family members and hence family support is vital in this case. Without proper family support, SMS-reminder intervention would not have been possible in female patients, and therefore, their family members need to be properly counseled regarding regular follow-ups to ensure drugs compliance.

Acceptability: After completion of intensive phase (i.e., 2 months of anti-TB treatment), all patients in intervention group were interviewed regarding acceptability of SMS reminders sent to them. Most of

Table 1: Comparison baseline characteristics of two groups

Baseline Characteristics	Intervention (n=74)	Control (n=74)	Total (n=148)
Gender:			
Male	32 (43.2%)	31 (41.9%	63 (42.6%)
Female	42 (56.8%)	43 (58.1%)	85 (57.4%)
Education Status:			
Yes	22 (29.7%)	21 (28.4%)	43 (29.1%)
No	52 (70.3%)	53 (71.6%)	105 (70.9%)
TB Status:			
Smear Positive	31 (41.9%)	34 (45.9%)	65 (43.9%)
Smear Negative	14 (18.9%)	10 (13.5%)	24 (16.2%)
Extra - Pulmonary	29 (39.2%)	30 (40.6%)	59 (39.9%)
Mean Body Weight:			
Before Treatment	49.3 Kg	48.8 Kg	-
After Treatment	50.8 Kg	50.2 Kg	-

the patients found it acceptable and helpful and were feeling good about it: Almost all (i.e. 99%) patients confirmed that project staff had explained to them the process of intervention i.e. SMS reminder (Figure-3). Majority (i.e. 82%) of patients was able to understand the SMS message sent to them as reminder tool (Figure-4). Almost all (i.e. 99%) patients took their anti-TB drugs every time they received SMS reminder (Figure-5). Majority (i.e. 78%) of patients felt easy to use mobile as a reminder tool (Figure-6). SMS reminders helped 97% patients to take their anti-TB drugs regularly (Figure-7). Majority (i.e. 91%) of patients were feeling good about SMS reminders; they liked this tool and found it helpful in taking anti-TB drugs regularly (Figure-8). Only 2.7% patients were not feeling good about SMS reminders, as they were unable to understand the message (Figure-9).

Figure 2: FeasIbility of Study

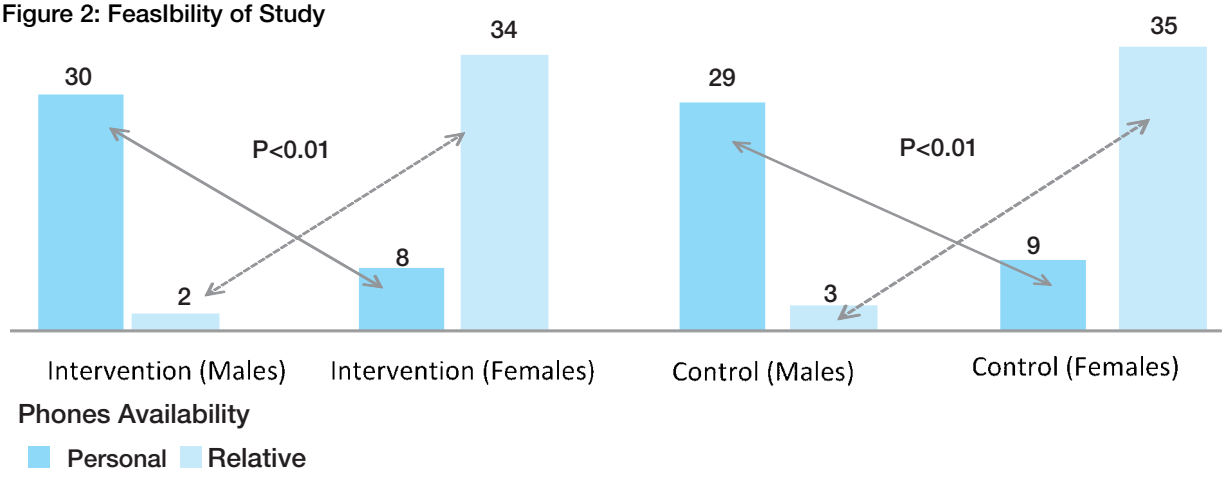


Figure 3: Did the project staff explain you about the SMS reminder?

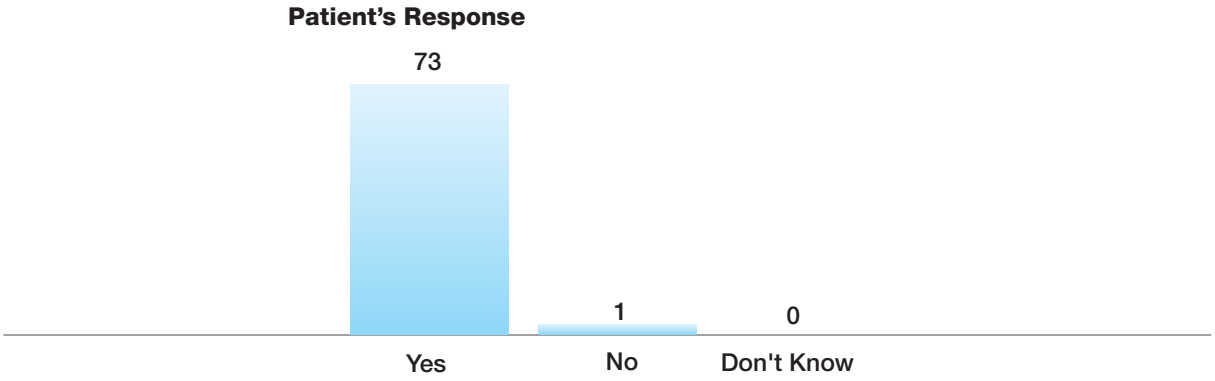


Figure 4: Did you understand the SMS delivered to you?

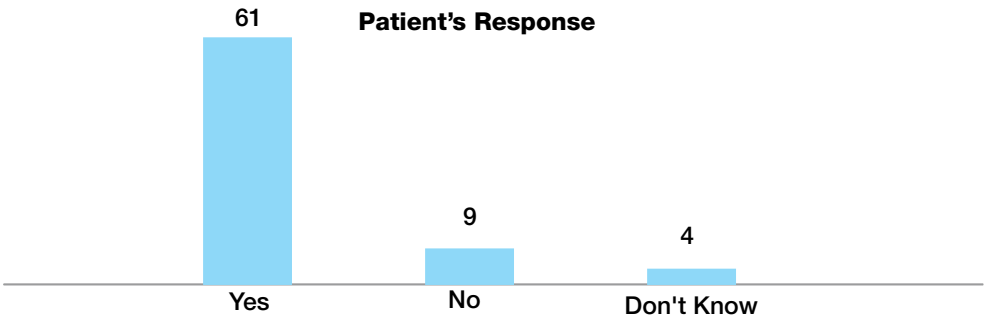


Figure 5: Did you take medicine after the SMS reminder?

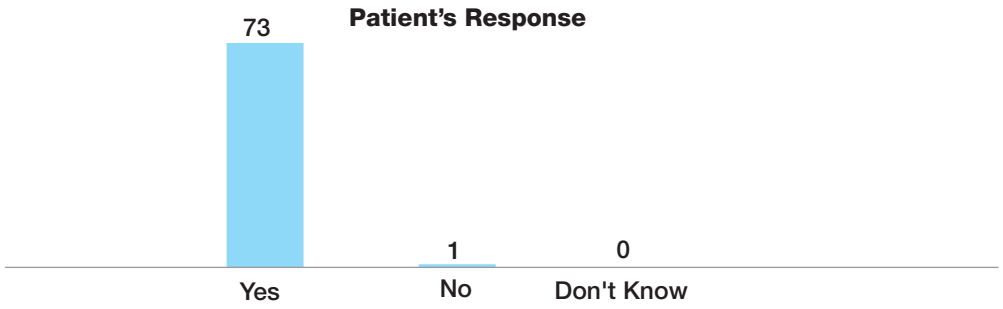


Figure 6: Did you feel easy to use mobile as a reminder tool?

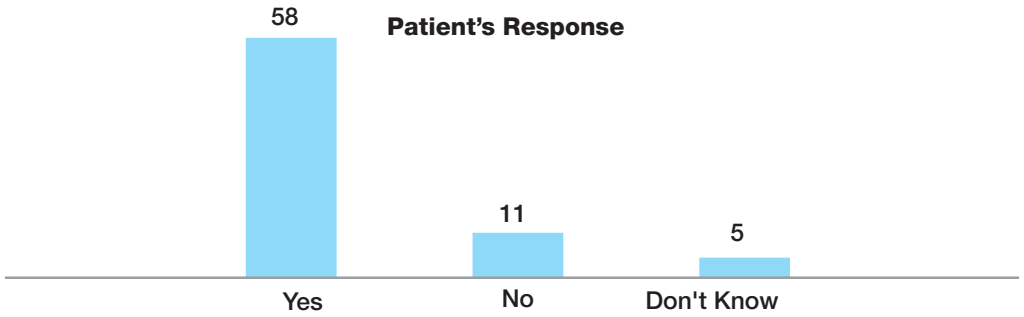


Figure 7: Did the SMS reminder help you to take your anti-TB drugs Regularly?

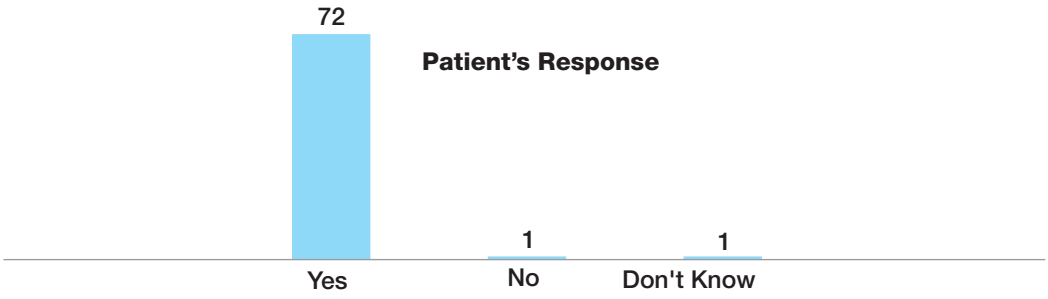


Figure 8: What are the good points about SMS reminder?

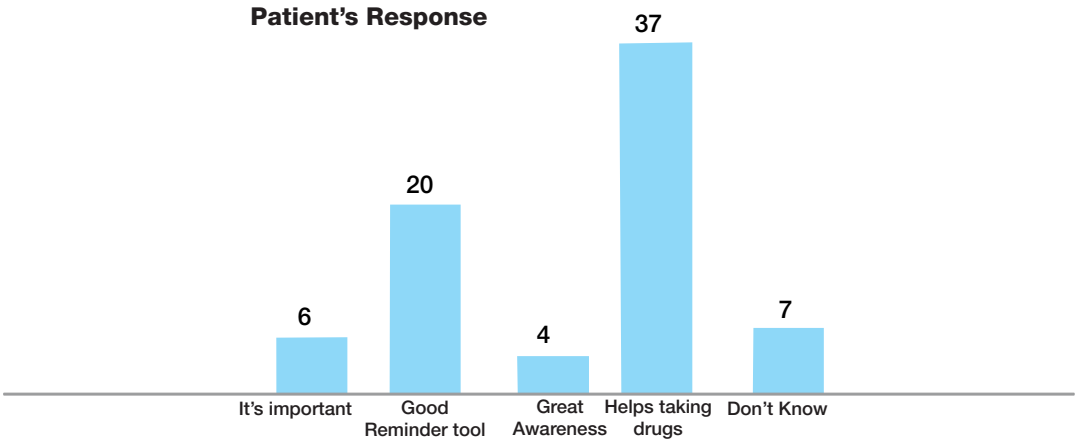
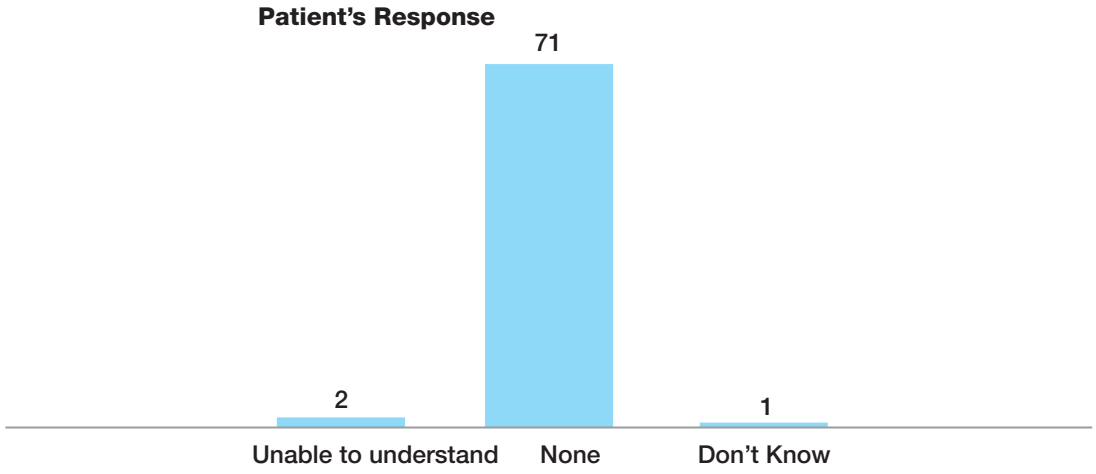


Figure 9: What are the bad points about SMS reminder?



DISCUSSION

Mobile phone technology is being used across the world and almost 6.8 billion people are using it to communicate with one another.[15] It is quick, reliable and most cost-effective tool of communication, and therefore increasingly used in healthcare systems now a days.[16] In Pakistan, till 2014, total mobile phone subscriptions had reached almost 140 million (76.2% of total population).[17] Tuberculosis is also chronic infection and needs regular drugs' taking for at least 6 months. In the national TB control, under DOTS strategy, patients are given free anti-TB drugs on monthly basis from TB centres across Pakistan. Poor drugs' adherence is also not uncommon in our patients because of many known factors. To improve drugs' adherence, SMS text message can be sent daily, early in the morning, to remind patients to take their drugs.[18,19] Even patients can confirm drugs' taking by reply-SMS text message.[20-24] We have provided new evidence that SMS-reminders are effective in improving drugs' adherence in our TB patients and may improve cure rate in our national TB program. Our findings suggest the SMS-reminder intervention was feasible to implement in our population. All included patients were having access to mobile phones and most knew how to use the SMS feature. Most of the male patients had personal mobile phones whereas most of female patients relied upon the mobile phones of their relatives.

Iribarren S, et. al.[25] found their study to be highly feasible to conduct.

Like our study, SMS-intervention has been reported by other studies as well.26-28 By evaluating how the text messaging intervention was used and through post intervention interviews, we found that overall the intervention was accepted by the participants. An aim of the Text TB intervention was to promote a supportive patient-healthcare professional relationship. A strong patient-healthcare professional relationship has been identified as highly important in TB control efforts. The main themes described by participants in the interviews and in the text message were feeling cared for, supported by staff, and thankful for information. On the basis of the results of this study, I conclude that we can improve drugs' adherence in our TB patients by sending them regular mobile phone SMS-reminder. It's a cost-effective, feasible and widely acceptable tool in our everyday clinical practice. It's easy to adopt and bring it in practice. Concerned healthcare workers and patients can be easily trained on it. By decreasing default rate, it may potentially improve cure rates of our TB control program

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