ORIGINAL ARTICLE

The trial of sending short message service multidrug-resistant tuberculosis patients in Indonesia: the chance to increase knowledge and motivation

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Abstract. Multidrug-Resistant Tuberculosis (MDR TB) is a threat for the future control of TB disease. In Indonesia, the success rate of MDR TB patient recovery is still very low, following the still low recovery rate of TB patients. This paper aims to discuss the trial result of message delivery containing knowledge and motivation to the MDR TB sufferers. There are about 34 MDR TB patients participating in this research. During the research, everyone received a message in their handphone or the handphone of their family members every day, contained information on medication and motivation to comply with the medication. At the end of the research, the measurement on knowledge and attitude, on the compliance with medication, and on the compliance with laboratory examinations was conducted. The results were compared with the assessment before this intervention was conducted. Out of 32 patients that managed to complete the intervention, the average means of their knowledge and attitude increased significantly. The average mean of knowledge before the intervention was 9.74 to become 10.94, and the average mean of attitude was from 7.06 to become 18.47 ($P<0.05$). Meanwhile, the medication compliance score and the laboratory examination compliance score also changed significantly ($P<0.05$). SMS delivery routinely even in a short period of time managed to change knowledge and motivation of MDR TB sufferers. To conclude, it is necessary to develop recent technology effort in order to scaling-up MDR TB patients. Existing social channels in the community must be used intensively to reduce this disease negative impact.

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Introduction

Tuberculosis (TB) is the second most transmitted disease that is really lethal after COVID 19 (1). Although TB is considered to have been suffered by one-fourth of the world population (2), the fact is the TB disease has more concentration in the Low and/or Middle Income Countries (LMIC) areas (3).

In the Southeast Asian area, Indonesia suffers the most due to the TB burden. Indonesia became one of the 8 countries in the world that had the coverage of the 2/3 world TB new sufferer number in 2020 (3), and it is reported as the second rank country of the world TB sufferers (4). Moreover, Indonesia becomes part of the 10 countries with 70 per cent of the global gap among MDR TB cases found with the sufferers that obtain medication (3). Based on the data from the Ministry of Health of the Republic of Indonesia, the medication success of the total TB cases is less than 90 percent, while the medication success of the MDR TB cases is only around 51 percent (5). Nevertheless, at the same time, the trend of MDR TB sufferers shows the significant increase so that it is estimated right now the number is approaching 10,000 cases (6).

To increase the health quality of MDR TB patients, the knowledge increase of the patients is essential because the knowledge of patients is closely related with the compliance toward medication and health examinations. Currently, WHO have recommended to strengthen digital health into the health service system (7,8). Various previous studies have done trials with the message delivery method via SMS to patients with the expectation to deliver the examination results, to carry out health examinations, to remind the patients of the timetable to take medicines or to interact with the health officers, all of which lead to the effort to increase compliance to medication (9-12). In Indonesia as far as the knowledge of the writer, there has not been any trial of specific SMS delivery to MDR TB patients, although there is similar research on TB patients (13). However, the review done by the USAID in Indonesia (14) and previous research (15) shows that SMS message delivery is one of the potential interventions to tackle MDR-TB in Indonesia. This paper aims to discuss the trial results of message delivery containing knowledge and motivation to MDR TB sufferers.

Materials and methods

Ethical considerations. This research was approved by Ministry of Research and Technology Republic of Indonesia. The ethical permit was obtained by the Faculty of Nursing of USU with the number 21171/VI/SP2020. Every patient was also explained about their rights to withdraw from the research at any time and with whatever reason.

Study design and setting. This research did trial to increase knowledge and motivation to MDR TB sufferers in Deli Serdang Regency, Indonesia. Every patient was sent messages through a personal or family's handphone. Around 34 MDR TB patients were recruited at the beginning of the research, but eventually there were only 32 people. There were 2 patients who passed away in the middle of the research. The MDR TB patients that became the respondents in this research are the sufferers that had gone through the medication treatment for maximum 6 months.

In total there were 27 different messages sent to the sufferers (see the appendix) every day by the research team. These messages are created from regular statement in the country or from spiritual idiom taken local context. By using these familiar sentences, we reminded the patient something that are in their range of understanding and easy to be applied.

Data analysis. To discover the knowledge and attitude as well as the compliance of the sufferers, at the beginning of the research and at the end of the message delivery, measurement was conducted using a questionnaire shared by the health officers. The questions on knowledge include 7 questions, the questions on attitude contain 18 questions, the questions on compliance to medication consist of 7 questions, and the questions on laboratory examination compliance have 3 questions. The mean score of every item was calculated and then compared.

Results

Table I shows the demographical description of the research respondents. The majority of the respondents were 18 years old, and most of them are men. The majority of the respondents have completed their high school education. More than half of the respondents, during the research being conducted, did not have a job. From the medication history, 58.82 per cent of them went through TB medication, never had contact with other TB patients (58.82 per cent), and never had contact with MDR TB patients (76.5%). From the confession of the officers, the patients suffered from TB at least more than one year (29.41%), even though many answered they did not know. Until today, the medication of MDR TB of the respondents has been done more than 12 months (50 per cent) with the long-term medication (85.3%). More than three-fourth of the respondents have a supervisor for taking medicines.

Table II shows that knowledge and attitude of MDR TB sufferers increase if compared with those before the sufferers were given continuous messages. Before the activity was done, the mean of knowledge was 9.74, and then it increased to become 10.94 ($P<0.05$). Meanwhile, the mean of attitude increased more than twice to become 18.47 ($P<0.05$). If we

Table I. The characteristic distribution of Multidrug Resistant Tuberculosis (MDR TB) patients based on the sociodemographic in the community health center of Deli Serdang Regency.

Characteristic	f	%
Age		
<45 years old	16	47.06
≥45 years old	18	52.94
Sex		
Male	21	61.76
Female	13	38.24
Education level		
Elementary	5	14.71
Junior high school	6	17.64
Senior high school	18	52.94
Higher education	5	14.71
Occupation		
Unemployed	18	52.94
Self employed	10	29.41
Lecturer	1	2.94
Mechanic	2	5.88
No answer	3	8.82
Having taken TB medication before suffering from MDR TB		
Yes	20	58.82
No	14	41.18
Having contact with TB patients		
Yes	12	35.29
No	20	58.82
No answer	2	5.88
Having contact with MDR/drug-resistant TB patients		
Yes	7	20.6
No	26	76.5
No answer	1	2.9
The length of suffering from MDR TB		
<12 months	6	17.65
≥12 months	10	29.41
No answer	18	52.94
The length of doing medication		
<12 months	7	20.59
≥12 months	17	50.0
No answer	10	29.41
Type of medication		
Long-term	29	85.3
Short-term	5	14.7
Whether there is the supervisor for the patient to take medicines		
Yes	27	79.4
No	5	14.7
No answer	2	5.9

Table II. The scores of Knowledge and Attitude of Multidrug Resistant Tuberculosis (MDR TB) sufferers in Deli Serdang Regency before and after the intervention.

	Before SMS intervention				After SMS intervention				
	n	Mean	Min-Max	SD	n	Mean	Min-Max	SD	P
Knowledge	34	9.74	5-16	3.136	32	10.94	5-19	3.565	0.004
Attitude	34	7.06	1-9	2.117	32	18.47	6-21	4.143	0.039

Table III. The compliance of the respondents to taking medicines before and after being sent SMS (n=32).

	Mean	SD	SE	P
Pre test	1.875	0.336	0.594	0.044
Post test	2.000	0.000	0.000	

Table IV. The compliance of the respondents to doing laboratory examinations before and after being sent SMS (n=32).

	Mean	SD	SE	P
Pre test	1.688	0.471	0.083	0.001
Post test	2.000	0.000	0.000	

observe it deeply, the quality increase of knowledge and attitude is clearly seen from the range of minimum and maximum scores. Before the activity, the range of knowledge was only 16-5=11 points, to become 14 points after SMS intervention, and the range of attitude was from 9-1=8 points to become 21-6=15 points after SMS intervention.

The intervention of routine SMS delivery is expected to give the impact to the compliance of sufferers. Table III shows the compliance of MDR TB patients. Before SMS intervention, the mean of compliance was only 1.875. After the intervention, it increased significantly to become 2.000 ($P<0.05$). It is not much different from the laboratory examination compliance. Before given the messages, the mean of examination compliance was only 1.688. However, it increased significantly to become 2.000 ($P<0.05$).

Discussion

This research indicated the positive signal happening in the MDR TB patients after they were sent SMS routinely for a month. Indeed, the medication in MDR TB patients always becomes a specific challenge considering that in general they have taken medicines for quite a long time previously. Table I shows that the majority of the respondents have taken the medicines for more than one year, despite the fact that they are mostly still in the productive age group. Nevertheless, the disease has made them lose their job very often. If seen from the majority's last education which is senior high school, it shows that the TB disease trend in general in developing countries occurs in those who are not lucky enough in their education. The low socio-economic configuration causes vulnerability in this group, both in the sub-group community in their country and at the level between countries.

TB and MDR TB are the diseases that can be cured. However, the knowledge of the MDR TB patients is central because without sufficient knowledge, medication can be ensured to fail. Ironically, there are many MDR TB patients having very low knowledge. In Addis Ababa, Ethiopia, there are more than 400 MDR TB patients in 10 health centers, and only half of them have good knowledge (16). Bad knowledge can cause misleading in understanding the disease they are suffering from. When understanding the perspective of the MDR TB patients in KwaZulu-Natal, South Africa, it was discovered that there are still sufferers who feel that their disease happens due to sort of punishment or because they are being hexed by someone (17) Since the MDR TB patients very often seek for alternative medication, that worsens their health condition (18).

The fact is that the low knowledge becomes a kind of a predictor to increase the MDR TB infection (19). Hence, it is not surprising if there is the consistency of low knowledge on TB in both TB patients and MDR TB patients. The bad knowledge since becoming TB patients (20) then causes the patients to fall into the condition as the drug-resistant patients. Thus, it is unavoidable that when becoming MDR TB patients, the strategic efforts need to be conducted continuously, including by adopting the message delivery method through handphone like in this research.

Table II shows the increase of knowledge and attitude of the sufferers significantly. The shift is seen very clearly in attitude, where the highest value previously was only 9, while after the intervention it became 21. Meanwhile, the highest level of knowledge only increased from 16 to 19. Indeed, the messages that were sent contain mixed messages, between knowledge and motivation to patients.

MDR TB patients indeed need motivation. In general, MDR TB patients have gone through the long-term medication method with quite a long period of time taking medicines (Table I). Because they require medication consistency, both TB patients and MDR TB patients together with their family can experience exhaustion and not small mental pressure (21,22) as well as stressful events (23). TB patients have the risk to fall into medication failure, and so do the MDR TB patients because the essence of medication lies in the compliance (24,25). Therefore, MDR TB patients really need support (26). The reminder via SMS is an effort to maintain

the patients' commitment to be able to recover because they know that they are supported at least by this researcher team.

The desire to recover is seen from the compliance of the sufferers to take medicines (Table III) and to carry out laboratory examinations (Table IV). The compliance is measured from the patients' reflection after receiving message delivery intervention. Certainly in a long-term this will need to be proven again by doing the examination of the medication results. The limitation of this research is that it cannot see the real outcome toward the recovery of the patients. However, other research reports show that SMS delivery encouraged the patients to do further examinations (27). Message delivery via SMS has a chance to apply the patient-centered approach toward the MDR TB patients (28) Even with SMS delivery, a good relationship between patients and health officers becomes closer (29,30), which will certainly have the contribution toward the recovery of the patients. If it is conducted appropriately, SMS delivery will increase the personal discipline of the TB patients (31-33).

Limitations and future research

Even though it has some obstacles within limited time, at least this research proves that in one time period, SMS as the message delivery method has given quite positive results in MDR TB patients. It is also important to emphasize that although this trial seems have an optimistic result, however it might be due to uncontrollable situation beyond authors control like campaigning from government, public campaign, etc. This research also gained positive result because we are able to access the location of intervention without any bureaucratic process, which is difficult to have in a large-scale intervention. Local autonomy probably would be the most problematic situation in Indonesia currently. However, as Indonesia is a very large country, sending messages in regular basis would be very easy and the cheapest way of health promotion, especially while most of the patience now already own their mobile phone.

The increase of knowledge and motivation of MDR TB patients really depends on many factors (33). It happens because it requires more efforts to maximize the technological function of this message delivery so that it can be advantageous optimally. The future research is really required to be conducted in LMIC countries such as Indonesia, because the medication success might be able to use social and religious groups (34), where the patients are generally affiliated in those groups. The research on how the SMS forms are made and even sent by these groups becomes important to increase the medication quality of MDR TB patients. Thus, patients receive not only information but also motivation.

Conclusions

SMS delivery gives impacts toward the increase of knowledge and motivation of MDR TB patients during the one-month trial. In addition to that, SMS delivery is capable of increasing the compliance to consuming medicines and carrying out laboratory examinations. This trial provides room for further and more comprehensive research.

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Authors' contributions

SS, DNS, conceptualized the study; SS, collected data; SS, DNS, analyzed data and discussed the findings; SS, DNS, analyzed data and discussed the findings; SS, DNS, drafted the manuscript; SS, DNS, corrected and finalized the manuscript; SS, guarantees the integrity of the study. All the authors have read and approved the final version of the manuscript and agreed to be held accountable for all aspects of the work.

Ethics approval and consent to participate

The ethical permit was obtained by the Faculty of Nursing of USU with the number 21171/VI/SP2020. During the study, we guarantee the participants rights to withdraw from the research at any time and with whatever reason.

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Conflict of interest

The authors declare no potential conflict of interest.

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