Review

A systematic review on telenursing as a solution in improving the treatment compliance of tuberculosis patients in the COVID-19 pandemic

Ni Nyoman Elfiyunai,[1] Nursalam,[2] Tintin Sukartini,[2] Ferry Efendi[2]

[1]Doctoral Program of Nursing, Faculty of Nursing, Universitas Airlangga, Surabaya Indonesia;
[2]Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia

Abstract

Introduction: The COVID-19 pandemic had made patients scared of coming to clinics or hospitals, and this could affect the treatment of TB. Therefore, one type of service that can be used by nurses to improve compliance to TB treatment is Telenursing. This article aims to ascertain whether telenursing could be a solution in improving the compliance of TB patients to treatments in the COVID-19 pandemic.

Design and Method: This research was conducted using the Randomised Controlled Trial design as well as PRISMA. Furthermore, useful research articles were sourced from the database using the keywords, "Message Reminder and Tuberculosis OR Medication Adherence". The databases used are Scopus, Science Direct, PubMed, and SAGE, all in English text and from 2015 to 2021, with inclusion criteria. 277 articles were obtained, and then filtered to select 3 articles by reading the main focus of the write-up, with regard to the topic of study.

Result: Telenursing can be a solution to reduce the spread of COVID-19, and a substitute for remotely motivating individuals, as social support. Furthermore, it could be used as a reminder to patients to be obedient in carrying out treatments, and as a means of educating and improving good relationships with providers.

Conclusions: Telenursing is a fairly effective solution in helping TB patients improve treatment compliance, reduce drug dropout rates and missed doses, as well as, raise awareness about the importance of health in the COVID-19 pandemic.

Introduction

Tuberculosis (TB) is one of the top 10 causes of death in the world.[1] Globally, about 10 million people were affected by the disease, with 1.4 million death in 2019.[2] TB control efforts with Direct Observed Treatment (DOT) Strategies have been implemented in many countries.[3,4] However, patients are still unable to complete treatment thoroughly or be declared cured of the disease.[5] Many patients do not comply to the treatment because they feel bored, they miss taking their medication, and do not routinely seek treatment due to the length of time the process takes.[6] usually about 6 to 8 months.[7]

Prolonged transmission of the disease, failure of treatment, and risk of resistant variants are serious problems.[3,8,9] Furthermore, Multidrug-resistance (MDR) can worsen the outcome of treatment, and lead to high morbidity and mortality.[10,11]

Social support is needed.[12] from friends, family, and health workers to improve patients' trust and compliance in treatment.[13] To support compliance, nurses play a role in providing education, communication, observation, and follow-up of patient treatment.[14]

During the COVID-19 pandemic, many health programs and disease control to the public were discontinued.[15] and this also impacted the treatment of cancer patients.[16] The secondary effects of the pandemic include damage to the economy, the spread of diseases, the reduction of health workers, as well as patients being afraid to come to health care centers.[17] The pandemic may also have increased the death of TB patients.[18]

Mobile technology has been useful for all countries in overcoming obstacles in the provision of health services.[19] Strategies to end the epidemic of global TB disease by 2035 require electronic health plans.[20] Therefore, a global digital health task force team was set up by the World Health Organization (WHO) in 2015 to help prevent and improve TB treatment.[21] Support digital medicine can monitor and ensure the treatment of TB patients.[22] Furthermore, mobile-health networks (mHealth) can help TB programs and improve treatment and control compliance to health care centers.[23] The use of cell phones is an alternative approach in providing support and reminding patients of their treatments.[24] It could also be used in providing support and information to improve patient compliance in treatment.[7,9,25] In the form of digital health, technology can help health workers monitor and support TB patients in terms of treatment adherence.[26] Previous research has cast doubt on the effectiveness of texting reminders in improving the treatment of tuberculosis patients.[4,7] Telenursing is very important to be used by health workers in pandemic times, to prevent the transmission of COVID-19. It could also be used to help remind patients to take medication and conduct periodic checks in health care centers. Therefore, the goal of this study was to ascertain whether telenursing is a solution in improving the treatment compliance of TB patients.

Significance for public health

Telenursing is very helpful for improving the compliance of patients to Tuberculosis treatment during the COVID-19 pandemic. Telenursing can be one of the options for the public to obtain information, as well as a form of support for patients in carrying out TB treatment and a reminder message to patients to take medication and visit health care facilities at times specified in the patient's mobile service. Telenursing can alleviate the burden on family members' minds when reminding patients to take their TB medication. Telenursing can reduce or eliminate the spread of tuberculosis (TB) to families, groups, or communities and prevent multi-drug resistance in patients and reduce TB mortality. Therefore, this form of nursing is the topic of study in this article. It could be an alternative in overcoming obstacles in the delivery of health services.

Table 1. Summary of data description from the included studies.

No	Author, Year	Design	Target, Age	Number of groups	Location	Therapy		Length of follow up	Outcome
				Intervention Control		Intervention	Control		
1	Gashu et al., 2021.[19]	RCT	Patient 18-50 years	152 and 154	Northwest Ethiopia	Received regular treatment, got weekly re-pill medication and got reminder messages in the local language (Amharic). For illiterate patients get a graphic message.	Only get regular treatment, which is taking medication every day with the help of support from health extension workers.	Follow up	The results of the patient intervention group that adhered to TB treatment 79.1%, the success of TB treatment 73.3% and the patient-provision relationship were 89.3%. While the control group was compliant with TB treatment 66.4%. Successful TB treatment 52.4% and good provider-patient relationship 85.1%.
2	Bediang et al., 2018.[4]	A Simple Blinded, RCT	Patient 18-50 years	137 and 142	Cameroon	Received regular treatment from the DOT and got daily SMS reminder messages in French	Received only regular treatment from the DOT.	Month to 2 Month to 5 Month to 6	The results of the intervention group for adherence to prescription drugs in the 2nd month were 98.5 (6.3)/ (50,100)%, the 5th month is 98.9 (5.8)/ (50,100)% of the 6th month which is 99.7 (1.8)/ (80,100)%, for the results of microscopic sputum examination in the 5th month that was successfully treated as much as 111 (81.0)% and the 6th month which was declared
No	Author, Year	Design	Target, Age	Number of groups	Location	Therapy		Length of follow up	Outcome
				Intervention Control		Intervention	Control		
									cured as much as 87 (63.5)%. while the control group for adherence to prescription drugs 3in the 2nd month was 99.3 (3.5)/ (70,100)%, the 5th month is 99.2 (3.8)/ (70,100)% of the 6th month which is 99.5 (1.7)/ (90,100)%, for the results of sputum examination in microscopy in the 5th month that was successfully treated as much as 106 (74.6)% and the 6th month which was declared cured as much as 88 (62)%.
3	Fang et al., 2017.[27]	Randomly divided	Patient 15 years	160 and 190	Province Anhui China	Received oral and written education about TB treatment and received sms messages every morning taking medication and reminded patients to re-control periodically	Group received only conventional DOT treatment.	Month to 2 Month to 5 Month to 6	The results of intervention groups for TB treatment compliance such as skipping doses by 30 (18.75%), disrupting treatment by 28 (17.50%) and completing treatment by 154 (96.25%). For re-examination of phlegm after 2 months of treatment as much as 155 (96.88%), sputum examination after 5 months of treatment as much as 148 (92.50%), re-examination after 6 months of treatment as much

Table 1. Summary of data description from the included studies.

No	Author, Year	Design	Target, Age	Number of groups	Location	Therapy		Length of follow up	Outcome
				Intervention Control		Intervention	Control		
						via Zindagi sms containing reminders to take medication.	care from the clinic		
5	Kumbo yono, 2017.[9]	post-test-only control led-group Trial	Patients 18- over 60 years old	45 and 45	Malang, Indonesia	In addition to receiving treatment, counseling from officers also receives text messages for motivation.	only get treatment and counseling from health workers	Follow up	There was no significant effect between patients who received sms reminder messages and those who received supervision from health workers with Fisher's Exact test results with a confidence level of 0.059.
6	Liu et al., 2015.[28]	A Cluster - Rando mised Trial	Patients 18 years	3069 and 1104	Provinces of Heilongjia ng, Jiangsu, Hunan, and Chongqin, China	Get text messages reminders taking medication, reminders to come every month to the doctor	Les patients reçoivent des messages prenant des médicament s de témoins dans le bras	Follow up	Use with treatment monitors obtained there was an increase in the compliance of patients taking TB drugs while those who received text reminder messages did not improve the patient's compliance with taking the drug.
7	Johnsto n et al., 2018.[29]	RCT	Patients Lebih 19 years	170 and 188	British Columbia, Kanada	Get weekly two-way sms and standard LTBI treatment	Only get standard LTBI treatment	Follow up selama 12 bulan	The results of the two-way sms showed no improvement in compliance in the treatment of LTBI.
8	Dewi et al., 2017.[30]	Quanti tative metho	Patients 18-61 years	60 and 60	Sleman District, Indonesia	Got standard DOTS therapy and daily text	Only get standard DOTS	Follow up	There was significant treatment adherence in the intervention group compared to the control

No	Author, Year	Design	Target, Age	Number of groups	Location	Therapy		Length of follow up	Outcome
				Intervention Control		Intervention	Control		
		d using quasi-e xperim ent				messages	therapy		group.
9	Ali & Prins, 2020.[31]	RCT	Patients 15-more than 30 years	74 and 74	Khartoum state, Sudan	Receive sms messages, phone calls and DOTS standards of care	Receiving a standard of DOTS care	Follow up	Patients with the intervention group had higher cure rates (78.4%), low treatment failure (6.8%) and had better knowledge of the control group.
10	Farooqi et al., 2017.[32]	RCT	Patients Over 17 years	74 and 74	TB clinics of Khyber Teaching Hospital Peshawar and Emergency Satellite Hospital Nahaqi, Pakistan	Getting daily text messages and 6-month Anti-TB treatment (regular DOTS)	Receiving anti-TB medication every month for 6 months (regular DOTS)	Follow up	Treatment failure was obtained as many as 7 patients (4.7%), in the intervention group that failed treatment 3 patients (4.1%) control group who failed treatment 4 patients (5.4%)

Design and Methods

This study used the Systematic Review approach and was carried out following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) method. The authors developed the research problem using PICO with the criteria of a TB patient population, interventions with short message service reminder messages, or cell phone calls for TB treatment. Furthermore, the authors studied patients who only received standard DOTS services, compliance, or improved treatment of TB patients, using a randomized, blinded, and controlled trial design. Keywords that were used: "tuberculosis", "reminder messages" AND "tuberculosis" OR "drug compliance", DOTS treatment, compliance, TB intervention, adherence. Additionally, articles in English published between 2015 and 2021 were obtained from Scopus, SAGE, Science Direct, and PubMed. Two hundred seventy-seven articles were found in the database, including 19 Scopus articles, 24 PubMed articles, 141 ScienceDirect articles, and 93 SAGE articles. The number of articles was reduced to 277 after identifying the articles thoroughly. Furthermore, 116 articles were re-selected based on this inclusion criteria: lack of focus on TB treatment, patient messaging services were not adequately discussed, received only regular treatment from the Directly Observed Treatment Shortcourse (DOTS), and no evidence about TB treatment adherence. Abstracts were also identified and filtered, reducing the number of articles to 161 and bringing the excluded articles to 70. Following the screening process, ten complete articles were selected and used. Data extraction from the selected articles was carried out with the distribution of extraction forms containing metadata such as the author's name, year, title, research design, subject criteria, research location, intervention, length of follow-up, and results, as shown in Table 1.

Results and Discussions

The results of the article selection are shown in Figure 1 of the flowchart. The review's findings yielded ten articles in the following categories: the respondents ranged from 15 to 80 years old, and the studies were conducted in Northwest Ethiopia,[19] Cameroon,[4] China's Anchui Province,[27] Pakistani Karachi,[7] Malang, Indonesia,[9] Heilongjiang, Jiangsu, Hunan, and Chongqin Provinces, China,[28] British Columbia Kanda,[29] District of Sleman, Indonesia,[30] State of Khartoun Sudan,[31] TB clinic Khyber Peshawar and Teaching Hospital Nahaqi Emergency Satellite Hospital, Pakistan.[32] A total of 8179 TB patients were studied in the overall study. The intervention group received mobile phone reminders and routine DOT care, whereas the control group only received conventional therapy. Previous study explained that through reminder messages sent every day from mobile phones about TB treatment in the form of text messages, there was an increase in treatment compliance, centered on good relationships between providers.[19] Text messaging effectively strengthens the level of complete treatment compliance in TB patients, as well as, reduces the possibility of missing medication schedules, and severed treatment. It also increases the awareness of patients to perform periodic checkups.[27] Medication monitors have also been shown to improve TB patient compliance, whereas receiving a reminder via text message does not affect medication adherence,[28] even though text messages are sent in both directions every week.[29] Because resources are limited, SMS reminders from mobile phones can help improve TB patient compliance.[30] When compared to patients who do not receive short messages, health services with reminder messages can have a high cure rate.[31] Meanwhile, another study stated that there was no increase in treat-

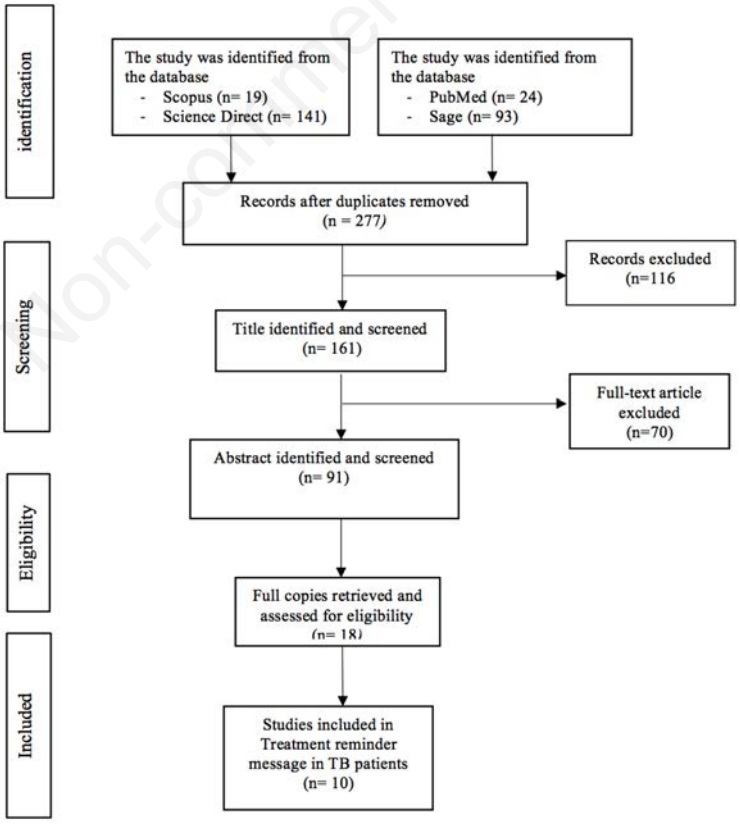

Figure 1. Literature search flow diagram.

ment success from reminders given via SMS. The low recovery of patients in the 6th month of treatment was estimated to be due to the condition of many school children dropping out of school between the 5th and 6th months of treatment.[4]

The discussion of the use of Telenursing has been the focus in different research and applied in various disease conditions, as described in the 10 articles above. Eight of the articles explained that there was an increase in treatment adherence and awareness of TB patients to conduct periodic examinations. Meanwhile, between two article showed that texting reminders do not improve the success of TB treatment and the proportion of cures due to high dropout rates between the fifth and sixth months of TB treatment.

To reduce the transmission of COVID-19, many measures used by the government, ranges from the wearing of masks, restrictions on crowded places, the closure of public spaces and limiting the number of visits to political gathering every day.[33] Meanwhile, as stated by the WHO, this virus was first reported as a pandemic in Wuhan China on December 8, 2019.[34] Since then, remote consultation by phone, such as Telenursing, was introduced as it could be beneficial to patients during the pandemic.[35,36]

Telenursing can provide social support especially when patients do not have someone to remind them about their treatment, or are far away from their social support. The patient feels the messages from sms can motivate them to comply to the treatment schedule regularly.[24] Telenursing via sms message can be a substitute in providing motivation to patients to take TB drugs.[9] From research in India and South Africa, patients undergoing TB-HIV treatment expressed discomfort using cell phone via sms.[23]

The use of telenursing for diabetic patients can help improve their compliance to take medication. It could also serve as a reminder to exercise control when eating, and assist in the provision of health education in urban India.[37] Studies conducted in Lesotho and Mozambique on TB/HIV patients via telenursing reported a good relationship between patients and health care providers in the intervention group.[38,39] Indian research into TB control can effectively use telenursing as a major source of information.[40] In North West Ethiopia most participants were willing to use telenursing as a means of reminder to take their medication.[41] Similarly, in disasters, the use of this form of nursing is essential in helping to provide care.[42] However, when the communication is made over the phone and the caller is unclear, there is the risk of the information received being wrong.[43] With regards to postnatal situations, consultation via video is fun, but in such conditions, the communication is usually dominated by nurses with a focus on the weight of premature babies.[44] Telenursing is also beneficial in interpersonal skills and helps evaluate the competence of doctors in learning activities.[45] In post-cataract surgery, telenursing can improve treatment adherence and can provide daily postoperative recovery information.[46] It could also be used in the case of burn patients to help in providing education and improving quality of life during the rehabilitation phase.[47] Remote care using telenursing in the implementation of regulation and education is very effective, safe, and virtually relevant.[48] It is also very beneficial in providing primary care, and could be developed and included in the law on the use of digital technology for nurses.[49] Finally, this form of nursing could be used in providing support on the provision of DOT to improve TB patient compliance.[50] It could also help improve adherence to treatment and healthy living in patients with a variety of chronic diseases.[51,52]

Studies on the use of telenursing with SMS may also assist patients in compliance with the release or replacement of endoscopic retrograde cholangiopancreatography (ERCP).[53] Finally, in diabetic patients, this form of nursing could improve patient compliance.[54]

Conclusions

Telenursing can be used during the COVID-19 pandemic to reduce health workers' contact with patients to limit the risk of transmission of the disease from officer to patient and vice versa. It is also a solution for assisting TB patients in improving their compliance to treatment, reducing drug dropout rates and missed doses, as well as raising awareness about the importance of health. Finally, based on this study, the application of telenursing is enough to help improve the compliance to TB treatment in the COVID-19 pandemic.

References

1. World Health Organization. Tuberculosis Global Report [Internet]. World Health Organization. 2019; Available from:

Correspondence: Ni Nyoman Elfiyunai, Doctoral Program of Nursing, Faculty of Nursing, Universitas Indonesia, Jl. Dr. Ir. H. Soekarno, Mulyorejo, Surabaya, Jawa Timur 60115, Indonesia,
Tel.:+62-31-5914042, Fax:+62-031-5981841.
E-mail: ni.nyoman.elfiyunai-2020@fkp.unair.ac.id.

Key words: Telenursing; tuberculosis; medication; adherence; COVID-19.

Acknowledgment: The author is grateful to the Doctoral Program of Nursing, Faculty of Nursing, Airlangga University, Surabaya Indonesia, for providing support and encouragement.

Contributions: All authors played a role in this article as NNE searched for articles from the database and compiled them, while N and TS served as lecturers and reviewed the final articles. Finally, the author is grateful to the FE lecturer for helping in improving the writing and authoring of this article.

Conflict of interests: The author declare no conflict of interest.

Funding: None.

Clinical trials: This systematic review study was conducted in accordance with the accepted practices.

Availability of data and materials: All data generated or analyzed during this study are included in this published article.

Ethics approval and informed consent: Not applicable.

Conference presentation: Part of this paper was presented at the 2nd International Nursing and Health Sciences Symposium that took place at the Faculty of Medicine, Universitas Brawijaya, Malang, Indonesia.

Received for publication: 3 December 2021.
Accepted for publication: 6 May 2022.

Licensee PAGEPress, Italy
Healthcare in Low-resource Settings 2023; 11(s1):11194
doi:10.4081/hls.2023.11194