

## Research Article

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## Evaluating the Effectiveness of “I LIKE VST” Digital Technology in Enhancing Tuberculosis Treatment Adherence in Moldova

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### ABSTRACT

This study assessed the acceptance and feasibility of the implementation of Video Supported Treatment (VST) “I LIKE VST” digital application as an approach to increase tuberculosis (TB) treatment adherence in the Republic of Moldova. It employed mixed quantitative and qualitative method among TB patients and healthcare providers. The analysis encompasses socio-demographic factors, adherence levels, technological accessibility, and user experiences with the VST app. Results indicate that VST app method is acceptable and feasible to implement for people who find it convenient, regardless of their level of education. Adherence data from the I LIKE VST system shows that 75% of participants have over 90% adherence rate, due to VST app’s digital nature offering convenience and flexibility. No cases of less than 50% adherence were found. Challenges include technological, financial barriers and the need for patient-centric customization. Less than 2% of TB patients have their own phones which support the app work. Moreover, 13.3% of TB patients and 19.7% medical staff stated that they did not have own resources to cover mobile internet costs, until they were covered by the project. This study demonstrates the effectiveness of digital health interventions in resource-limited settings. The findings are particularly relevant for policymakers and health practitioners aiming to innovate TB treatment adherence strategies.

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### Abbreviations

**DATs:** Digital Adherence Technologies

**DOT:** Directly Observed Treatment

**HCW:** Healthcare Worker

**RCT:** Randomized Controlled Trial

**TB:** Tuberculosis

**VST:** Video Supported Treatment

**DR-TB:** Drug-Resistant Tuberculosis

### Introduction

Tuberculosis (TB), particularly in its drug-resistant forms, remains a significant public health challenge globally. Innovative approaches are required to improve treatment adherence, a key determinant of successful TB management. Digital Adherence Technologies (DATs) are the digital tools, which support people who receive their TB and help capturing detailed, specific patient adherence information. Compared to directly observed therapy (DOT), DATs allow TB patients to take their treatment at convenient place and time, supervised by health care worker (HCW). DATs also could help HCWs to distinguish patients at high-risk. There are currently various types of DATs available, in this study we focus on video-supported treatment (VST). VST deploys a video connection between the patient on TB treatment

and the HCW to observe medication taken. According to the randomized controlled trial (RCT), performed in Moldova in 2020, VST increased observed medication adherence for TB patients, compare to clinic-based DOT [1]. VST decreased non-adherence by 4 days per 2-week period, as well as it reduced the time and finances patients spent on TB treatment.

This study introduces “I LIKE VST,” a digital intervention aimed at enhancing TB treatment adherence in the Republic of Moldova. It explores the integration of video-supported treatment (VST) into the healthcare system, addressing both the challenges and potential of digital health technologies in TB care. The introduction of VST reflects a shift towards people-centered approaches, leveraging technology to overcome barriers in traditional treatment models. This paper examines the feasibility, acceptability, and impact of “I LIKE VST,” considering the unique socio-economic and healthcare context of Moldova.

### Materials and Methods

#### Study Design

The research utilized a mixed-method approach, including quantitative and qualitative data collection methods. Quantitative component included a survey of 120 patients enrolled in VST in the period January 19-29, 2021 and 60 health providers trained in VST. Qualitative research (in-depth interviews with 15 people on TB treatment and 15 HCWs, directly involved in the monitoring people undergoing TB treatment in VST.

### Sample Size

120 people on TB treatment out of 246 enrolled in VST at the time of the study and 60 health workers out of 86 trained in VST, resulting in inclusion rates of 49% among people on TB treatment and 70% among health workers.

### Sampling

Exhaustive, by inviting participation to all people undergoing TB treatment, enrolled in the video-assisted method with the aim to have at least 120 questionnaires filled in and at least 60 from 86 service providers involved in monitoring this type of treatment. For the qualitative component of the study, 15 respondents were selected among people undergoing TB treatment according to the criteria of age, gender, locality (urban/rural), duration of being in video-assisted treatment. Among the health workers, 15 people were also randomly selected for this component. Areas of assessment included: demographics, treatment adherence, technological accessibility.

### Qualitative

Participants’ experiences, perceptions, and challenges with the VST system. The study assessed technological accessibility and user-friendliness. Data on socio-demographic variables, adherence rates, and user satisfaction were systematically collected and analyzed. Ethical approval obtained from the Bioethics Commission of IMSP Institute of Pneumology “Chiril Draganiuc” on January 21, 2021.

### Data Analysis

Quantitative data were analyzed using SPSS statistical software. Qualitative data were transcribed and subjected to thematic analysis to extract key themes and insights.

### Ethical Considerations

Ethical approval was obtained from the Bioethics Commission of IMSP “Chiril Draganiuc” Phthisiopneumology Institute. Participants were ensured confidentiality and informed consent was obtained prior to data collection.

### Technology Assessment

The functionality and user-friendliness of the “I LIKE VST” digital tool were assessed. This involved testing the system’s technical aspects and assessing its integration into the existing healthcare framework.

### Results

The results showed that 35.8% of “I LIKE VST” users are with secondary education or less. Educational level of TB patients in VST closely mirrors the general cohort of people on TB treatment, which is 29%. The study also found that most patients did not need technical support for medication notifications, with 18% relying on VST notifications and 10% setting mobile phone reminders. This indicates that higher adherence (75% of participants have over 90% adherence rate, no cases of less than 50% adherence were found) is not solely dependent on the app’s notification functionality, but also on direct benefits perceived by patients. Benefits include time and cost savings (Table 1). VST significantly reduces the time required for medication administration, daily time saving of approximately 43 to 64 minutes for patients, compared to traditional DOT settings. Results in a cost analysis indicates that VST, including mobile internet costs, is more cost-effective than traditional DOT, with notable reductions in treatment costs for both drug-sensitive and drug-resistant TB. Cost reduction per treatment course for drug-sensitive TB from 565.8 MDL to 1,748.4 MDL (depending on the place of treatment administration – CS or DOT office within the phthisiopneumological service) and from 1,131.6 MDL to 3,496.8 MDL per treatment course for drug-resistant tuberculosis).

**Table 1: Time Spent and Supported Costs by People in Treatment**

Cost type		Time (minutes)		Cost (USD)	
		VST	DOT	VST	DOT
Number of visits	To district TB office	2.2	21	2.2	21
	To rural health center		20		20
Cost / time for visit (minutes)	To district TB office	66	66	0.9	
	To rural health center	45	45	0.3	
Total cost (MDL)	To district TB office	165.2	1386	1.95	18.6
	To rural health center	119.0	900	0.65	6.05
Optimization rate when switching from DOT to VST	To district TB office	-88%		-90%	
	To rural health center	-87%		-89%	
Per treatment duration	DS TB	TB office	6 months	11.7	111.6
		Health center		4.01	36.35
	DR-TB	TB office	12 months	23.38	223.20
		Health center		8.02	72.68

Results on understanding the challenges faced by TB patients using VST, showed that 98.3% of TB patients and 31.1% of medical workers had personal mobile phones provided by the project, enhancing access to necessary tools for VST. In the absence of funding less than 2% of people with TB, who have their own phones, could benefit from this method. 13.3% of TB patients and 19.7% of medical staff stated that they have never had personal resources for internet traffic, until they were covered by the project. Another challenge is stigma, related to using the VST app, 40% of respondents do not feel comfortable using the app in the presence of other people and 54.2% do not feel comfortable using the app outside the home. Also, people who have used the VST app are concerned

about privacy issues, with 39% concerned about video privacy, and 36% concerned that using the VST app may lead to disclosure of their TB status. These results suggest that while VST has potential, its success is contingent on addressing technological, financial, and social barriers to ensure its sustained use and effectiveness.

### Discussion

Reveals that the “I LIKE VST” digital tool for TB treatment in Moldova is well-received among TB patients across various educational levels, indicating broad acceptability regardless of educational level. The study highlights VST’s effectiveness in a setting like Moldova, where TB remains a public health priority, and digital solutions are increasingly vital. VST implementation during the pandemic stresses the importance of flexible treatment criteria to accommodate patient’s needs. The study’s findings about VST’s acceptability across educational levels and its contribution to improved treatment adherence demonstrate the potential of digital interventions in enhancing TB care in similar socio-economic contexts. This aligns with global health goals to enhance treatment efficiency and patient experience, particularly in resource-constrained settings. The observed high adherence rate, even among patients who did not strictly meet enrollment criteria, underscores VST’s effectiveness. This suggests that broader, more inclusive criteria might enhance treatment accessibility and efficacy. The success of VST, achieved despite deviations from standard criteria, demonstrates its potential as a patient-centric and adaptable treatment method, reliant on sustained support, resource allocation, and ongoing patient and staff motivation.

Challenges such as funding for equipment, internet access, stigma, and the sustainability underscore the need for integrated strategies and policy support for digital health interventions in TB care. During the project, TB patients received monthly internet packages, but concerns about funding for future internet access were noted. A significant proportion of patients felt uncomfortable using the VST application in the presence of others or outside their homes, indicating stigma and privacy concerns. Some patients admitted to missing treatments or not recording their medication intake, often due to application issues or incorrect use, highlighting the need for continuous support and training.

Nevertheless the challenges, results suggest that VST is not only a time-efficient approach but also cost-effective, potentially offering a more accessible and manageable TB treatment option. The study evaluates the cost-effectiveness of the “I LIKE VST” program, revealing significant cost reductions compared to traditional DOT methods. Patients using VST reported a decrease in daily time commitment and travel expenses for treatment. Additionally, the study provides detailed cost comparisons between VST and DOT, highlighting substantial savings in VST implementation.

The study suggests a need for revised, more inclusive enrollment criteria and continued support for healthcare workers and patients to optimize the success of the VST program. Such analysis should further explore how VST could serve as a model for similar interventions, considering its cost-effectiveness and potential to revolutionize patient-centered care in public health [2,3].

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