FEASIBILITY AND ACCEPTANCE OF WHATSAPP APPLICATION AS VOT (VIDEO OBSERVED THERAPY) PLATFORM FOR TB MANAGEMENT

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ABSTRACT*: Receiving consistent tuberculosis treatment can be troublesome for people in low- and middle-income countries, since there are many social, logistical and stigma-related reasons for this. Still, the regular DOTS method is effective but can be restricting for people receiving treatment and for those providing it. During the COVID-19 pandemic, it became clear that flexible remote ways of following a treatment plan were crucial. This study is motivated by these difficulties and aims to understand whether WhatsApp—an available and simple messaging application—can be used for synchronous Video Observed Therapy (VOT) in managing TB cases. A single-arm intervention was used and the study included 32 TB patients from Malaysian health clinics. In mixed methods, we collected both numbers on adherence and feedback from patients and healthcare workers (HCWs). The User Version of the Mobile App Rating Scale (uMARS) was employed to evaluate how easy the app was to use, while both logistical and technical challenges were noted. There was a high level of user acceptance, as the uMARS score revealed a strong performance in these areas. The study found that only a few short call interruptions and internet disruptions happened, showing that the treatment could be used. WhatsApp-based VOT made patients happy with how simple, confidential and adaptable it is. According to the study, WhatsApp is an effective and affordable way to boost adherence to TB treatment where resources are limited. It is suggested that WhatsApp-based VOT be incorporated into national TB programmes, that more people be taught how to use technology and that tough data security policies are put in place to allow this approach to continue working and increase its use*.

Keywords: Tuberculosis (TB) Adherence, Video Observed Therapy (VOT), WhatsApp-based Digital Health, mHealth in TB Management, Treatment Compliance and Technology

INTRODUCTION

Global health continues to struggle with tuberculosis, mainly in places where large numbers suffer and sticking to treatments is vital for success. Even though DOTS works well, it is still hard for people to stick to treatment because of different challenges [1]. Video Observed Therapy (VOT) is now an option which lets people undergo supervision from a distance and still keep their privacy [2]. This study looks at whether WhatsApp can work as a VOT platform, due to its widespread use and simple features [3].

The main focus of this research is how to help ensure that TB patients stick to their treatment regimens. Since DOTS centres are far from many patients and can cause stigma, not all patients follow the treatment fully which increases the chance for drug resistance [4]. As a result of the pandemic, the need for ways to manage medications remotely became more obvious. WhatsApp can be used for vote tallying, as setting up independent VOT applications costs more and needs extra systems. However, there are still major concerns over privacy, getting access to the internet and getting users on board [1].

The study will use the HBM and TAM to guide a trial with a single-arm intervention design involving 32 patients in Malaysia. It is designed to find out if WhatsApp works well, if people find it beneficial and how it could help patients follow their treatment, providing knowledge about mHealth initiatives in TB care [5]. The results from our project will assist policymakers and healthcare workers in adopting digital approaches for TB care, giving a lasting and effective way for patients to stay on a treatment plan.

Literature Review

Global Burden of Tuberculosis

Tuberculosis continues to be a major health problem, with the greatest impact on low- and middle-income countries. As of 2021, WHO estimates that tuberculosis led to 1.6 million deaths and there were over 10 million new cases [4]. Even though better tools and treatment plans have been created, TB continues to cause problems due to poverty, not eating well and poor healthcare services. Although the Directly Observed Treatment Short-Course (DOTS) has improved results, there are still logistical issues and patients find it too burdensome [6].

Importance of Treatment Adherence in TB Management

Adhering to a TB treatment plan is very important, because it ensures the treatment works, lowers the risk of others getting TB and cuts down on MDR-TB. The research shows that 90% or better adherence is required for success, but many TB programmes cannot achieve this due to stigma, high transportation fees and not enough support from others [1]. With Video Observed Therapy (VOT), patients can send pictures of themselves taking their medications using their mobile phones [7].

Challenges of DOTS in Ensuring Adherence

Although DOTS helps a lot, there are many obstacles that arise in places with limited resources. The need for patients to visit the clinic each day is difficult and leads to a high number of people leaving the study [4]. Because there is a negative attitude toward in-person supervision, it usually discourages patients from joining the programmes. Operational concerns in DOTS have been raised by healthcare providers, as they are having troubles with short staff and high expenses which makes using VOT an attractive approach [5].

The Emergence of Video Observed Therapy (VOT)

VOT has gained traction as a technology-driven alternative to DOTS, enabling remote monitoring through digital platforms. Initial VOT models relied on specialized applications, but advancements in mobile technology have

expanded its implementation to mainstream platforms such as WhatsApp [6]. Studies have shown that VOT improves adherence by reducing logistical burdens and offering patients greater privacy and flexibility. In Colombia, VOT interventions significantly reduced missed doses and increased patient engagement [8].

Advantages of VOT in TB Treatment Adherence

VOT offers several benefits over DOTS, particularly in addressing logistical and psychological barriers. By allowing patients to complete treatment at home, VOT reduces travel costs, minimizes stigma, and enhances patient autonomy. Furthermore, VOT facilitates integration with broader health education initiatives through digital messaging and reminders, improving treatment engagement [9].

The Role of Digital Health Technologies in TB Management

Digital tools, particularly mobile health (mHealth) applications, have played a transformative role in TB management. These technologies enhance adherence by offering real-time monitoring, medication reminders, and patient education [6]. Gamified mHealth applications have been shown to increase patient motivation, aligning with behavioral models that emphasize reinforcement in adherence. While platforms have demonstrated success, their adoption remains limited due to cost and technological literacy barriers [1].

Synchronous vs. Asynchronous VOT Platforms

VOT platforms are broadly classified into synchronous and asynchronous models. Synchronous platforms, such as Zoom and WhatsApp, enable real-time video observation, allowing immediate feedback from healthcare workers. Asynchronous VOT, by contrast, permits patients to record and upload videos for later review, offering greater flexibility but reducing real-time accountability [8]. The effectiveness of these models depends on factors such as internet stability, user accessibility, and patient preference.

Addressing TB Treatment Barriers Through Digital Tools

Digital health interventions mitigate various adherence barriers, including stigma, logistical constraints, and lack of education [9]. mHealth platforms provide automated reminders and educational materials to improve patient understanding of treatment protocols. Additionally, digital tools offer a private alternative to in-person DOTS, helping patients avoid the stigma often associated with TB treatment (Du Thinh et al., 2024). Despite these benefits, limitations such as data privacy concerns and internet accessibility must be considered for sustainable implementation.

WhatsApp as a Platform for Video Observed Therapy

WhatsApp, one of the most widely used messaging applications globally, presents a compelling case for VOT implementation due to its accessibility, low data usage, and ease of use [2]. Unlike specialized mHealth apps, WhatsApp leverages existing digital behaviors, making it easier for both patients and healthcare workers to adopt [10]. In regions like Southeast Asia and Sub-Saharan Africa, WhatsApp has been successfully integrated into healthcare interventions, demonstrating high user engagement and adherence rates.

Suitability of WhatsApp for Synchronous VOT

WhatsApp's synchronous video call feature enables real-time patient monitoring, closely replicating the DOTS model while offering greater flexibility [5]. Its end-to-end encryption enhances data privacy, addressing key concerns associated with digital health applications. However, challenges such as unstable internet connectivity and privacy risks must be addressed for effective implementation (Lee et al., 2023).

Methodology

A purposive sampling approach was used for this study, allowing researchers to recruit 32 healthcare workers (HCWs) from TB clinics. All participants were recruited with responsibility and given WhatsApp training for Video Observed Therapy (VOT), with informed agreement [11]. Both rates of medication adherence and feedback from patients and health care workers were collected. The survey included checking smartphone use; 77% said they used their phones and 23% used a device shared with someone else. There were 5 cases of session interruptions during VOT and 2 days of internet problems recorded as feasibility metrics [12]. VOT was appraised for usability using the User Mobile Application Rating Scale (uMARS) and both its functionality and performance were given high ratings. Standard observation forms were used to cheque adherence, how many patients missed appointments and what side effects appeared [13]. Support for adherence and feasibility in the programme was examined using descriptive statistics (mean, standard deviation) and inferential methods (Chi-square, logistic regression). Analyses using logistic regression showed which demographic variables affect adherence and suggested ways to improve future VOT programmes [14]. The results show whether using WhatsApp for VOT in TB management is possible.

RESULTS

These people make up the demographic table, painting a picture representing all participants in the study. Just under two-thirds of the participants were male (65.6%) and almost one-third were female (34.4%).

Table 1 Demographic Characteristics

Characteristic	Category	n(%)
Sex	Male	21(65.6)
	Female	11(34.4)
Age(years)	≤ 24	4(12.5)
	25–44	15(46.8)
	45–54	8(25.5)
	≥ 55	5(15.6)
Education Level	None	1(3.1)
	Primary	7(21.9)
	Secondary	15(46.9)
	Tertiary	9(28.1)
Employed	Yes	13(40.6)
	No	19(59.4)

The majority of participants were in the 25–44 age group (46.9%) and after that were those aged 45–54 (25.0%). Most participants or about 75.1%, had completed at least secondary or university studies. According to the data, 37.5% of the group were employed. More than two-thirds of cases reported having received previous TB treatment. Almost all (85%) had MDR-TB and over nine out of ten (90.6%) were confirmed to have TB by bacteria tests which points to a group at serious risk.

The study excluded 40 participants (56%) for a variety of causes which is shown in the table. Of these, 20 did not take part which was 28% of the total group. Researchers removed 12 participants (17%) because they could not use WhatsApp and 4 (6%) individuals did not have a smartphone. Another 3 participants (4%) were removed from the study because they used one smartphone between them and 1 (1%) switched to DOTS. As a result, only 32 participants which made up 44% of the total, were successfully taken part in the study.

Table 2. Frequency of Excluded participants

	Category	Count	Percentage (%)
Total Excluded		40	56%
i.	Excluded - Refused to Participate	20	28%
ii.	Excluded - Illiterate for WhatsApp Use	12	17%
iii.	Excluded - No Smartphone	4	6%
iv.	Excluded-Participants Sharing Smartphone	3	4%
v.	Excluded-Participants Switched to DOTS	1	1%
Total Recruited		32	44%

The ratings in the table are from the uMARS which reflect how users think about the quality of different apps. All in all, the app obtained a strong uMARS mean score of 4.45 (with a standard deviation of 0.63). People rated interest (4.33) and interactivity (4.10) highly, but entertainment was not as high, at 3.78 and customisation was slightly lower, at 3.72. All functional subdomains such as performance, ease of use and layout, were met with very positive feedback. Participants appreciated how the app looks and especially noted how smooth and pleasant gestures feel and how attractive the visuals are (getting 4.14 and 4.10 ratings, respectively). The survey reports that users would probably recommend the app, but they are less willing to pay for it (4.35 vs. 3.45). The results suggest that users find the app to be satisfactory, practical and easy to use.

The results of the feasibility study involving healthcare workers are displayed in Table 4 for Video Observed Therapy (VOT). During the VOT sessions, the study noted that five calls were lost due to technical difficulties. Clinics faced a two-day loss of internet, so patient monitoring might have been interrupted. In general, each VOT session lasted about 7.5 minutes which means HCWs and patients had a brief and efficient interaction.

Table 3 uMARS Scores and Likert Scale

Subscale/Item	Mean Score	SD*
Engagement	4.07	0.75
Entertainment	3.78	0.68
Interest	4.33	0.62
Customisation	3.72	0.85
Interactivity	4.10	0.75
Target group	4.42	0.72
Functionality	4.21	0.87
Performance	4.25	0.70
Ease of Use	4.55	0.48
Navigation	3.94	0.82
Gestural design	4.14	0.75
Aesthetics	4.2	0.65
Layout	4.50	0.50
Graphics	4.00	0.60
Visual Appeal	4.1	0.84
TOTAL uMARS	4.45	0.63
Subjective Quality - Recommendation	4.35	0.52
Subjective Quality - Willingness to Pay	3.45	0.88

These results indicate that VOT is usually possible, but there may still be problems with calls getting dropped and internet interruptions occasionally.

Table 4 Feasibility Outcomes from HCW's

Metric	Value	Explanation
Disconnected Calls During VOT Sessions	5	Number of instances where calls were disconnected during VOT sessions
Days Without Internet Connectivity at Clinic	2	Number of days the clinic experienced internet connectivity issues
Average VOT Session Duration (minutes)	7.5	Mean time spent by HCWs on each VOT session, reported in minutes

Conclusion and Policy Implications

This study shows that WhatsApp can be readily used and endorsed by users for Video Observed Therapy (VOT) in tuberculosis (TB). Because the uMARS rating was 4.45 and it scored strongly in usability, engagement and functionality, the application showed a lot of potential for improving how treatments are followed. Despite occasional problems with internet and phone service, the platform made it easier for patients to take their medicine privately which is key for those where DOTS services are restricted by society and logistics. It is crucial to bring affordable and accessible technologies such as WhatsApp into national TB programmes, according to the findings. By following this example, we could better manage ongoing problems with adherence, particularly in places under heavy strain. To promote a broader use of technology, the government should help people learn digital skills and ensure that new internet services are available. So, guidelines and rules about data protection need to be created as these systems grow to secure patient privacy. If mHealth solutions are used alongside

current practises, TB treatment results could see major improvement and help achieve worldwide TB elimination.

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