An observational study on tuberculosis medication adherence using asynchronous video observed therapy in Orange County, California

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Introduction

A key intervention recommended by the World Health Organization to assure medication adherence is directly observed therapy (DOT).[1] However, in-person, clinic-based DOT or home-based DOT is time and resource intensive for both staff and patients, as well as being relatively inflexible and somewhat dehumanizing.[2,3] With the advent of mobile technology, a smartphone app-based form of DOT—video observed therapy (VOT) has emerged to address some of these issues. Numerous studies have shown improved medication adherence with use of these types of e-visits.[4-7] A recent survey looking at the use of VOT in the United States found that 42% of programs already use some form of electronic DOT, while 36% plan to implement it in the future.[8] While many of the surveyed programs felt that VOT was as good or better than traditional DOT, most programs did not have plans to assess effectiveness.

In Orange County, California, VOT with the emocha Mobile Health's VOT app was implemented in 2019. Although both synchronous (where the patient and provider have a live video call) and asynchronous (where the patient leaves a video recording for the provider to watch) types of VOT are used in Orange County, the decision was made to study asynchronous VOT alone. The study was implemented to examine effectiveness, comparing the medication adherence found with asynchronous VOT at the Orange County Health Care Agency with the 88.4% to 94% adherence rate found in the recent literature.[6,7,9]

Methods

Patients on asynchronous VOT from April 2019 to October 2020, being treated for active tuberculosis (TB) disease and latent TB infection (LTBI) were included whether they were solely on VOT or switched to/from another modality. Only days where patients were on VOT were evaluated for adherence. Adherence was defined as "the extent to which a person's behavior… corresponds with agreed recommendations from a health care provider."[1] Reasons counted for non-adherence included missed submissions, incomplete dose, self-administration, and not following dosing protocol. VOT visits missed due to hold status, side effects, technical difficulties, hospitalization, or marked as omitted were excluded from the adherence analysis.

Demographics

The cohort consisted of 43 patients, 20 who identified as males and 23 who identified as females. Ages ranged from 16 months to 89 years with an average age of 42. Sixty-five percent of patients were working age adults under the age of 65 (Figure 1).

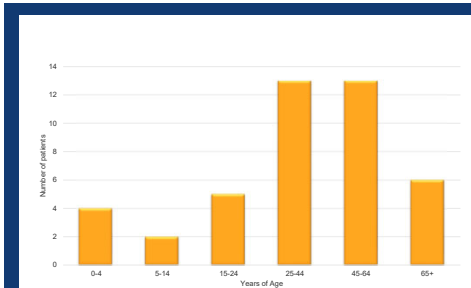

Figure 1. Age distribution of VOT cohort (n=43)

Treatment

Forty patients received treatment for active TB disease while three received treatment for LTBI. Out of 40 patients treated for TB disease, 35 completed treatment while on VOT while two patients switched to in-person DOT. Two discontinued VOT for other reasons and one patient had TB ruled out. Overall, 88% of patients being treated for active TB disease finished VOT successfully and completed treatment. All three LTBI patients successfully completed VOT and treatment.

Results

The most common reasons asynchronous VOT visits were rejected were missed submissions, which made up 40% of overall rejections, followed by omitted, which made up 20% of rejections (Figure 2). Eighty percent of the visits identified as omitted were related to a patient who temporarily transferred to another jurisdiction, but later returned to finish treatment. This was followed by hold status and hospital admissions, which constituted 12% and 9% of rejected videos, respectively. Finally, incomplete doses accounted for 6% of rejections, while self-administered accounted for 5% of rejections.

Incorrect protocol and side effects accounted for 2% of rejections each. Technical difficulties accounted for 4% of all rejections. Overall, dates marked as "treatment not applied" accounted for 7% of all video submissions.

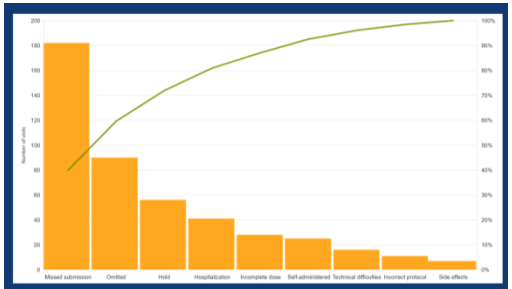

Figure 2. Reasons for video rejection

There were 5,827 asynchronous VOT visits reviewed, of which 5,617 were used to analyze adherence. The average time on VOT was 20 weeks with 12 of the 43 achieving 100% adherence. The median adherence was 98% with most patients within 96% to 100%. The average adherence was 96%, ranging from 54% to 100%.

There were 246 VOT visits reviewed meeting the non-adherent criteria. Missed submission was the main reason for non-adherence, making up 74% of non-adherent videos. Other reasons included incomplete dose (11%), self-administered dose (10%), and incorrect protocol (4%) (Figure 3).

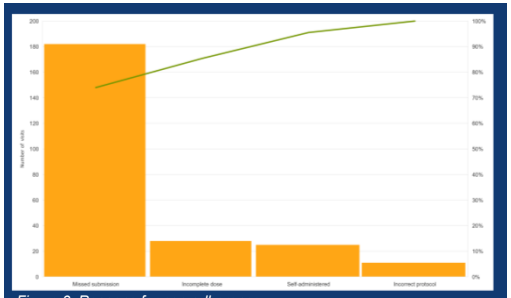

Figure 3. Reasons for non-adherence

Conclusion

Overall, our experience using VOT in this cohort yielded a 96% adherence rate commensurate with the prospective pilot study by Holzman, et al. which found patients to be 94% adherent to their TB medication on VOT.[10] Despite the wide age distribution and the fact that asynchronous VOT requires a mobile device with internet access, technical difficulties only accounted for 4% of cases where treatment was not applied. From these observations, it appears that patients of all ages who have access to a mobile device with internet access possess the ability to adhere to asynchronous VOT with a high degree of success. Our data demonstrates that VOT administered asynchronously in a real world setting through the Orange County Health Care Agency can replicate the success rates previously seen in the existing literature.

This is also commensurate with the 96% adherence rate we have achieved with patients enrolled in our in-person DOT program in Orange County, California.

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