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Feasibility of Using Tuberculin Skin Test Screening for Initiation of 36-Month Isoniazid Preventive Therapy in HIV-Infected Patients in Resource-Constrained Settings

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Introduction: The tuberculin skin test (TST) can be used to identify HIV-infected people who would benefit the most from long-term isoniazid preventive therapy (IPT). However, in resource-constrained settings, implementation of the TST can be challenging. The objectives of this study were to assess the feasibility of implementing the TST for IPT initiation and to estimate the proportion of TST-positive incidence among HIV-positive patients in 2 high tuberculosis and HIV burden settings.

Methods: Two prospective observational cohort studies were conducted under programmatic conditions in Mathare, an urban slum of Nairobi, Kenya, and in rural Shiselweni, Swaziland. HIV-positive adults with negative tuberculosis symptomatic screening underwent the TST. Those testing positive were started on 36-month IPT.

Results: Of 897 and 1021 patients screened in Mathare and Shiselweni, 550 and 696, respectively, were included. Median age was 38 years, 67.7% were female, and 86.8% were on antiretroviral therapy. Among TST-eligible participants, 88.0% (491/558) and 81.8% (694/848) accepted TST and 74.2% (414/558) and 77.1% (654/858) returned for test reading in Mathare and Shiselweni, respectively. The TST was positive in 49.8% (95% confidence interval: 44.9 to 54.6) in Mathare and 33.2% (95% confidence interval: 29.6 to 36.8) in Shiselweni. The 36-month IPT was accepted by 96.1% (198/206) patients in Mathare and 99.5% (216/217) in Shiselweni. IPT implementation at the clinics was managed with no additional staff or extra space.

Conclusion: Implementing the TST for IPT initiation was feasible and acceptable in both urban and rural resource-constrained settings. This strategy allows patients who can benefit the most to receive long-term IPT and avoids unnecessarily treating a significant number of patients who do not stand to benefit.

Key Words: isoniazid preventive therapy, tuberculin skin test, HIV, tuberculosis, Africa, feasibility

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INTRODUCTION

The risk of developing tuberculosis (TB) from latent or newly acquired *Mycobacterium tuberculosis* infection is higher in HIV-infected people than in those who are uninfected.[1] TB is responsible for more than a quarter of all deaths in people living with HIV (PLHIV).[2]

The World Health Organization guidelines for isoniazid preventive therapy (IPT) for PLHIV in resource-constrained countries recommend offering IPT to these patients to reduce their risk of developing active TB.[3] Current recommendations are ambiguous as these guidelines state both that the tuberculin skin test (TST) is not a requirement for IPT initiation and that PLHIV who have a positive TST benefit more from IPT than those who test negative. This last conclusion is based on several studies that showed that IPT reduces the risk of active TB by 60%–70% in PLHIV who are TST positive but has no significant effect in those who are TST negative.[4–6] A large randomized trial in Botswana showed a 74% reduction in TB incidence among TST-positives receiving 36-month IPT compared with 6 months only and no benefit in TST-negative patients.[5] In practice, countries choose between implementing a 6-month IPT protocol that does not include TST or a 36-month one with preselection of TST-positive individuals.

In deciding whether to opt for the longer IPT strategy based on TST, national HIV programs in resource-constrained countries should consider 2 key factors. The first is the prevalence of positive TST among PLHIV, which is believed to determine the added value of testing: if most PLHIV have a positive TST, it may not worth the investment of clinic resources to perform the test routinely. The second factor is the operational feasibility of implementing TST in HIV clinics. Implementation in resource-constrained countries can be challenging because TST requires an effective supply chain (including cold chain), good-quality tuberculin for performing the test, staff with training and time to

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administer and read the test, and patients able to attend the clinic twice over 48 to 72 hours. Cost can also be a barrier, although studies so far suggest that using TST is cost-effective.[7–9] In practice, and likely at least partially for pragmatic reasons, HIV programs often forego the TST and instead implement 6-month IPT for all PLHIV.[10,11]

Kenya and Swaziland are among the countries that chose this IPT 6-month strategy in 2011.[10,11] TB and HIV burden are high in both countries, the latter has the highest national levels reported worldwide. In 2012, TB incidence was estimated to be 272/100,000 per year in Kenya and 1349/100,000 per year in Swaziland.[12] In the same year, HIV prevalence in adults was 5.6%[13] in Kenya and 27.4%[14] in Swaziland.

Although studies from several settings have reported the prevalence of positive TST in PLHIV[15–17] and other have assessed various aspects of feasibility in implementing TST,[18–20] this is one of the few studies that provides information on clinic-level aspects involved in TST implementation in both urban and rural resource-constrained settings. The objectives of this study were to assess the feasibility of implementing TST for IPT initiation in PLHIV and to estimate the proportion of PLHIV with a positive TST, in 2 settings with high HIV and TB prevalence. The aspects of feasibility we evaluated were: patients' acceptability of TST and of being started on a 36-month IPT regimen, and practical issues of implementation at the level of clinic and patient routines such as training on TST, time spent on TST-related activities by the clinics' staff, space used for it, patients' constrains, and challenges faced during the implementation.

METHODS

Study Design

Two prospective observational cohort studies were conducted under programmatic conditions in Nairobi, Kenya, and in Shiselweni region, Kingdom of Swaziland.

Sites

The Kenya study was conducted in Mathare clinic, a private HIV/TB facility supported by Médecins Sans Frontières (MSF). The clinic was located in a slum of Nairobi, an urban area. Patients lived in the slum at short distance from the clinic. The Swaziland study was conducted in 2 nurse-led primary health care clinics in rural Shiselweni region (the New Haven public clinic and Our Lady of Sorrow, a private facility), both supported by the Ministry of Health and, since 2007, with additional support from MSF. Patients were spread out in a large area (up to 20 km). All 3 clinics provided comprehensive HIV care, antiretroviral therapy (ART), and TB diagnosis and treatment, free of charge. Mathare clinic was dedicated to only patients with HIV and TB, whereas in Shiselweni, HIV/TB services were fully integrated into general outpatient care. Mathare HIV clinic was staffed with 1 doctor, 4 clinical officers, 5 nurses, 5 counselors, and 3 laboratory technicians, whereas each of the clinics in Swaziland was staffed by 3 nurses, 1 or 2 nursing assistant, 1 phlebotomist, and 2 expert clients. At the time of the study 3500 patients were actively followed in Mathare clinic and 1200 patients in the 2 Shiselweni clinics. In Mathare, 6-month IPT had been offered to patients before the study (July to December 2011) and TST was implemented in January 2012. The 2 clinics in Swaziland were providing 6-month IPT for all adult PLHIV since 2010 and TST had not been implemented before the study.

Population

All HIV-infected adult patients coming for consultation to the participating clinics were eligible for the study. Study populations and procedures were similar in both countries. Patients aged 15 years or older in Kenya and 16 years or older in Swaziland (legal age of consent) with a negative TB symptomatic screening and who signed informed consent were included. Exclusion criteria were the following: TST already performed in the clinic, contraindications to IPT, and being on IPT as secondary prophylaxis (immediately after a TB treatment). A previous 6-month course of IPT was not an exclusion criterion. IPT contraindications in both sites were the following: symptoms of active TB, currently receiving TB treatment, medical contraindication for isoniazid, and needing to initiate ART or being on ART for less than 3 months. In Swaziland, patients who recently started ART or who reported a positive TB symptomatic screening could be rescreened for TST eligibility at a subsequent visit. Additional contraindications in Kenya (but not Swaziland), due to differences in national policies for IPT, were pregnancy, history of Multidrug-resistant TB, or contact with a patient with Multidrug-resistant TB. In Swaziland sites, patients who told study staff that they could not return for a TST reading were not enrolled, whereas in Kenya, patients fulfilling the inclusion criteria and signing informed consent were included even if they knew that they could not return for TST reading.

Study Procedures

Patients were screened for TB using a checklist of symptoms: current cough, fever, weight loss, and night sweats.[3] In Swaziland, chest pain was also included in the list, as per national guidelines.[11] Patients with a positive TB screening were evaluated further for the presence of TB or other illnesses. TST was performed using Tuberculin PPD RT 23 SSI (Statens Serum Institut, Denmark) in Kenya and Tubertest (Sanofi-Pasteur MSD, France) in Swaziland at the dose of 0.1 mL. The TST was performed on the first day and read 2–3 days later. On the reading day, patients with a positive test (defined as $\geq$5 mm) were started on 36-month IPT. In both sites, TST was repeated for patients who came late ($>$72 hours) for reading and had a negative result. Because of programmatic priorities at the time of the study, no tracing was done in Kenya, whereas in Swaziland, a phone call was made to those not presenting after 48 hours for reading. To assess interreader agreement, the TST was read by a second reader (blind to the first result) on the same day for a randomly selected group of patients. Information concerning the operational aspects of implementing the TST-based IPT strategy was collected by the study investigators through qualitative interviews with key

personnel (zone supervisors, head of the clinic, human resources officer, clinical officers, nurses, and pharmacist), direct observation through visits to the sites, and review of clinic registers. The information collected included: training before starting TST, roles of staff involved in TST/IPT activities, material and equipment used, patient flow, and number of visits during the study period. In addition, the time spent by the patients in each of the steps from TB screening to IPT drugs delivery was measured in 64 patients in Mathare by a person independent of the health staff. The time spent on TST administration and reading was measured in one of the clinics in Shiselweni by the clinic supervisor in 8 and 9 patients, respectively.

Sample Size and Data Analyses

The sample was based on the estimation of the prevalence of TST positivity in the study population. We assumed a proportion of 50% positivity, a precision of 5%, and an alpha error risk of 5%, which resulted in samples of 384 patients per site. Assuming a 10% rate of refusal to test and 20% default rate of patients not returning for reading increased this number to 550 patients per site.

Data were entered using Epi-Data 3.0 software (The Epi-Data Association, Odense Denmark) at the study site and analyzed using Stata 12.0 software (College Station, TX). Acceptability of the TST was assessed by calculating the proportion of patients who accepted TST among those eligible for the TST and the proportion of patients who returned to the clinic for reading among those eligible for the TST. Acceptability of IPT initiation corresponded to the proportion of patients started on IPT among TST-positive. We used a multivariable logistic regression model adjusted for age, gender, CD4 count, history of TB treatment, and previous or current IPT to identify factors associated with not returning for TST reading. In Swaziland, distance to the clinic and transport cost were added to the model. The proportion of TST-positive patients was calculated among all patients with a TST performed and read. The predictors of a positive TST result were identified through logistic regression using baseline patients' characteristics (age, sex, past TB treatment, being on ART, and CD4 count). The kappa coefficient was calculated to assess the interreader agreement of the TST result.

Ethical Considerations

The Mathare study protocol was approved by the KEMRI/National Ethical Review Committee in Kenya and the Comité de Protection des Personnes (CPP), Saint Germain en Laye, France. The Shiselweni study protocol was approved by the Social Welfare Scientific Ethical Committee of Swaziland and the MSF Ethical Review Board. Written informed consent was obtained from all study participants.

RESULTS

Study Population

In Mathare, Kenya, of 897 PLHIV screened, 550 (61.3%) were included in the study from June to October 2012. As shown in Fig. 1, 17.8% (160/897) of screened patients were excluded because of positive TB symptom screening, whereas 9.5% (85/897) were ineligible because of having a TST performed in the clinic before the study. Among 558 eligible patients, 4 (0.7%) did not wait for inclusion in the study and 4 (0.7%) declined to participate.

In Shiselweni, Swaziland, 696 (68.2%) were included of 1021 screened from August 2012 to March 2013. Patients could be rescreened at a subsequent visit if they started ART less than 3 months ago, had a positive TB symptom screening, or initially refused the TST. In total, 14.9% (152/1021) patients had a positive TB screening at any of the screening visits and ultimately only 67 (6.6%) were excluded for this reason. Of the 152 TB suspects, 28 (18.4%) were investigated for TB and 2 (1.3%) were given TB treatment. Of 848 eligible patients, 152 (17.9%) declined to participate, mainly because they were unable to return for the reading of TST.

Among the 1246 patients included in both countries, 844 (67.7%) were female (Table 1). Median age was 38 years (interquartile range: 31–46), and ART had been initiated in 1082 (86.8%) patients. Most patients, 74.1% (923/1246), had a CD4 count above 350 cells/μL. This proportion was higher in Mathare compared with Shiselweni: 84.4% vs 66.2%, $P < 0.001$. Patients in Mathare had been on ART for a longer time compared with those in Shiselweni (median of 5 years compared with 2 years). Most patients in Mathare had already received a 6-month course of IPT, compared with half of those in Swaziland.

TST Acceptability and Return for Reading

Among all patients eligible for the TST, 88.0% (491/558) in Mathare and 81.8% (694/848) in Shiselweni accepted the TST. Proposing more than 1 screening visit in Shiselweni increased both the number of eligible patients (from 787 at the first visit to 848) and the number accepting the TST (from 596 to 694). Of those tested, 84.3% (414/491) and 94.2% (654/694), respectively, returned to the clinic for the test reading, corresponding to 74.2% (414/558) and 77.1% (654/858) of those eligible, respectively. TST reading took place on the planned day for 97% and 94% of the patients, respectively. Men (adjusted odds ratio [aOR] =1.6, 95% confidence interval [CI]: 1.04 to 2.3) and patients on ART (aOR=2.5, 95% CI: 1.3 to 4.7) were more likely to not return for test reading in Mathare, whereas age below 30 years increased the odds of not returning (aOR=2.8, 95% CI: 1.4 to 5.5) in Shiselweni. There was no association with the distance to the clinic or transport cost ($P > 0.20$) but a trend in favor of returning for patients with previous IPT (aOR=0.57, 95% CI: 0.28 to 1.2) in Shiselweni.

TST Results

The TST positivity rate was 49.8% (95% CI: 44.9 to 54.6) in Mathare and 33.2% (95% CI: 29.6 to 36.8) in Shiselweni. The proportion of TST-positive patients varied according to the CD4 count (Table 2). TST positivity was lower in patients with CD4<200 cells per microlitter compared with those with CD4 ≥200 cells per microlitter:

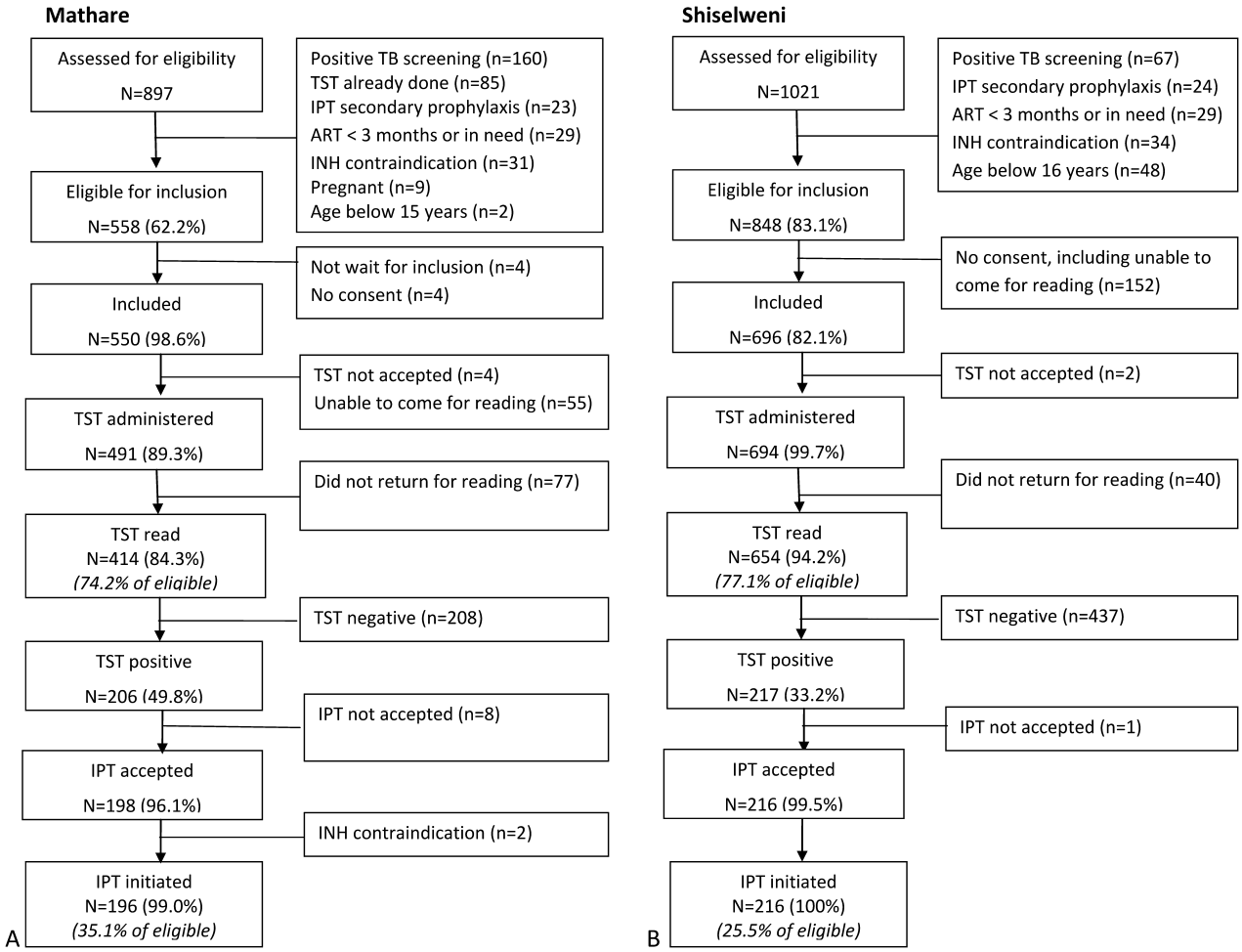

FIGURE 1. Flowchart of patients included in study, screened with TST, and initiated on IPT: (A) Mathare, Kenya, (B) Shiselweni, Swaziland.

in Mathare, 29.2% vs 51.0%, $P = 0.038$; and in Shiselweni, 15.3% vs 35.5%, $P = 0.001$. Being on ART and having a CD4 count ≥200 cells cells per microlitter were the factors associated with TST positivity in Mathare, whereas in Shiselweni, the associations were with CD4 ≥200 cells cells per microlitter and previous TB treatment (Table 3).

TST reading agreement for the TST result as positive/negative was excellent: 99.5% (kappa = 0.99, 95% CI: 0.97 to 1.00) in Mathare and 99.2% (kappa = 0.98, 95% CI: 0.95 to 1.00) in Shiselweni. For measurement of the TST reaction in millimeters, agreement was moderate: 61.5% (kappa = 0.50, 95% CI: 0.46 to 0.54) in Mathare and 61.0% (kappa = 0.45; 95% CI: 0.36 to 0.55) in Shiselweni.

IPT Acceptability and Initiation

Starting 36-month IPT was accepted by 96.1% (198/206) of all TST-positive patients in Mathare and 99.5% (216/217) in Shiselweni. All were given IPT except for 2 in Mathare, for whom a contraindication to receive isoniazid was detected at the time of prescription. Overall, among patients eligible for the TST, 35.1% (196/558) and 25.6% (216/848) were started on IPT in Mathare and Shiselweni, respectively (Fig. 1).

Implementation Challenges

A summary of findings on operational aspects of the TST-based IPT initiation strategy is shown in Table 4. A short theoretical training (approximately 4 hours) followed by on-the-job training (approximately 3 days) was provided to the nurses to introduce the TST for IPT initiation. Regular clinic staff conducted all activities necessary for TST-based IPT implementation. In Mathare, 4 clinical officers performed TB symptomatic screening during the routine medical consultation and 1 nurse was dedicated to TST screening 3 days per week. In Shiselweni, TB symptomatic screening was done by a trained expert client or by a nurse. The TST was performed by the regular nurses during routine ART consultations. No additional space was allocated for testing except a consultation room at 1 clinic in Swaziland.

In both settings, initially some patients were injected with only 0.05 mL of tuberculin (half-dose) probably because of confusion with BCG, also were administered intradermally.

TABLE 1. Characteristics of the Study Population

	Mathare (N = 550)	Shiselweni (N = 696)
Age, median (IQR)	39 (33–45)	38 (30–47)
Female, n (%)	372 (67.6)	472 (67.8)
On ART, n (%)	460 (83.6)	622 (89.4)
Duration on ART (yrs), median (IQR)	5 (2–7)	2.4 (1.1–3.6)
Time since HIV diagnosis (yrs), median (IQR)	6 (3–8)	2.8 (1.5–4.8)
Median CD4 (IQR)	564 (427–749)	433 (301–591)
CD4 category, n (%)		
<200	34 (6.2)	77 (11.1)
200–349	52 (9.5)	157 (22.7)
350–499	128 (23.3)	176 (25.4)
500 and above	336 (61.1)	283 (40.8)
Past TB treatment	188 (34.2)	157 (23.0)
Time since TB treatment (yrs), median (IQR)	5 (3–6)	2.8 (1.7–5.1)
Past IPT 6m	457 (96.8)	328 (48.0)
Time since end of IPT (mo), median (IQR)	5 (4–6)	1.1 (0.7–1.4)
Currently on IPT	11 (2.3)	45 (6.6)

This occurred with the first patient of the study in Mathare and 37 patients during a few days in Shiselweni. This error was rapidly detected and corrected. The prevalence of TST positivity was not different when these 38 patients were excluded.

In Kenya, the average time a patient spent for TST screening (eligibility assessment, waiting time, interview, TST administration, and reading) was 21 minutes. The 4 clinical officers dedicated an average of 5 minutes for a clinical officer each day to assess TST/IPT eligibility for a total of 9 patients per day. The nurse spent on average 35 minutes per day to conduct TST counseling, study consent procedure, and to perform TST for an average of 5 patients per day, and another 12 minutes per day to read the results. In Shiselweni, patients traveled for an average of 35 minutes (1 way) for the extra visit to the clinic.

DISCUSSION

Although it is known that IPT benefits TST-positive PLHIV but has little demonstrable benefit in TST-negatives, many countries skip this testing and instead favor shorter-course IPT to all PLHIV, thereby limiting the impact on TB prevention and unnecessarily treating those who do not benefit. In this study, we assessed the 3 main components of the decision on whether use TST-based IPT initiation, namely acceptability of TST, operational feasibility of TST implementation, and TST positivity. We found that both TST and IPT were acceptable to the majority of patients and the return rate to the clinic for the test reading was high. The TST was feasible in programmatic conditions and could be easily integrated into the clinic routine with proper training of the staff.

Concerning the TST positivity, half of the patients with PLHIV in Mathare and one-third in Shiselweni were TST positive and would therefore benefit from 36-month IPT, whereas the considerable remaining proportion of patients with a negative TST would not be unnecessarily administered isoniazid. Overall, the prevalence of a positive TST in both sites was within the range of other settings in sub-Saharan

TABLE 2. TST Results

TST Result	Mathare (N = 414)	Shiselweni (N = 654)
TST positive, n (%)	206 (49.8)	217 (33.2)
TST positive according to the CD4 level (cells/mL), n/N (%)		
<200	7/24 (29.2)	11/72 (15.3)
200–499	59/131 (45.0)	99/312 (31.7)
≥500	140/259 (54.1)	107/268 (39.9)
Induration (mm), median (IQR)	18 (14–20)	15 (10–20)

IQR, interquartile range.

TABLE 3. Factors Associated With the TST Positive Result (Multivariate Analysis)

	Mathare aOR (95% CI)	*P*	Shiselweni aOR (95% CI)	*P*
ART	1.66 (1.001 to 2.74)	0.049	—	—
CD4 ≥200 cell/μL	2.79 (1.13 to 6.93)	0.026	3.2 (1.6 to 6.2)	0.001
Past TB treatment	—	—	1.8 (1.2 to 2.6)	0.004

TABLE 4. Operational Aspects of TST Implementation

	Mathare	Shiselweni
Staff in charge		
TB symptom screening	Clinical officer	Lay counselor ("expert patient")
Eligibility assessment	Clinical officer	Nurse
TST administration and reading	Nurse	Nurse
Drug delivery	Nurse	Nurse/pharmacy assistant
Time per patient (minutes)		
Eligibility assessment	3	Not assessed
Waiting	9	Not assessed
TST administration and study questionnaire	6	7
TST reading	3	5
Drug delivery	3	Not assessed
Total time for TST (minutes)	9	12
Patient's transport cost for extra visit	Not assessed	1€
Workload for staff, % of working time		
Eligibility screening (9 patients/day)	1%	Not assessed
TST performing and reading (5 patients/day)	10%	Not assessed
Working space	No adjustment	Extraconsultation room

Africa.[17] We expected a higher prevalence in Shiselweni because of its very high estimated prevalence of active TB.[12] This could be partially explained by a lower average of CD4 count in patients from Shiselweni, but it also suggests that prevalence of latent TB measured by the TST does not necessarily directly correlate with prevalence of active TB in a specific HIV-positive population, an issue that is still relatively unexplored in the literature. It seems that there is still much to uncover in terms of the dynamics of TST reversion and conversion at population level.[21,22] Nevertheless, our findings show that measuring the TST is relevant even in settings with high TB burden.

Previous TB treatment was associated with a positive TST in Shiselweni but not in Kenya. The longer delay since previous TB treatment at the Kenya site may explain this difference. Also, as described elsewhere,[17,18] TST results were associated with the CD4 count, with a lower proportion of TST positivity in patients with less than 200 CD4/μL. The TST is less sensitive in detecting latent TB infection in immunosuppressed patients.[23,24] Some authors have proposed to defer IPT until completion of few months of ART in patients presenting advanced immunodeficiency.[25]

Patient acceptability of the TST was high in both settings: more than 80% of patients eligible for the TST were tested, and among them 86% of them returned for reading of their result (around 74%–77% of all eligible). The main reason patients stated for refusing the TST was that they could not return to the clinic for reading. However, acceptability increased when patients were given advance notice of the need to return, so they had time to make arrangements for the additional visit. A similar level of acceptability for the TST was reported in a Voluntary Centre for Testing in Uganda where 76% of the patients had a TST read.[15] Acceptability of 36-month IPT initiation was extremely high (95%) in both our study settings, consistent with reports from other contexts.[19,26,27] Factors associated with not returning were different in each site, probably due to the different circumstances of the patients in the two contexts. The role of previous IPT in the acceptability is difficult to interpret. In Mathare, patients who had received previous IPT were not more likely to return for reading, whereas in Shiselweni, there was a trend in this sense. Patients who had already received IPT may think that no additional prophylaxis is necessary or may be more likely to accept the TST because they had already been sensitized in the topic. True assessment of 36-month IPT acceptability will require assessment of retention and adherence over time, which is currently ongoing in Shiselweni.

The operational aspects of adapting routine clinic practices to accommodate TST testing were manageable. Time spent on the TST for both staff and patients was relatively short. No additional staff was necessary, nor was extra space required because the procedure could be done in the consultation room. All clinics had a refrigerator used to store drugs and vaccines, and it was used to store tuberculin. However, there were some difficulties in Shiselweni to ensure proper monitoring of the cold chain, which were finally solved through reinforced training and supervision. Another problem encountered was a risk of confusion between TST and BCG vaccine. To ensure accurate administration of TST, this point should be emphasized and reinforced during training. The use of 0.1-mL autodisable syringes would be a more robust solution that should be explored further, as it is usually not part of standard material available to the clinics. For patients, the key issues were related to the second visit for TST reading, which implied additional time and transportation costs. However, this did not seem to have a major impact on TST acceptability. Challenges were similar in both urban and rural settings despite the different contexts. In both sites, the TST was integrated within the daily routine but in different ways: in a well-staffed and busy urban clinic, it was more appropriate to have a person dedicated to the TST, whereas in an integrated primary care clinic, it was better to have the TST included into consultation. Tailoring the intervention to the clinic routine and the wishes of the staff was probably a key factor in the success of the implementation.

The proportion of patients with a positive TB symptomatic screening was high in both settings (15%–20%), a finding that underscores the importance of assessing for TB symptoms in all HIV-infected patients coming for first or follow-up consultation. However, in Swaziland, it was noticed that only a minority of those patients were actually investigated for TB, which highlights the limitation of a very sensitive symptomatic screening. This led to many patients being denied IPT although they were certainly not all who have active TB. Patients with positive screening should truly be assessed for TB, and if not considered, suspect IPT should be proposed again at a subsequent visit.

This study has some limitations. The study was conducted in an MSF private clinic in Mathare and in MSF-supported public or private clinics in Shiselweni, which may not reflect the conditions of all local public clinics, which may face more challenges in terms of training, staff shortages, logistic support, and overall supervision. In addition, clinics that have not introduced any previous IPT may require longer training for the staff. The time for the TST procedure may have been underestimated in patients already sensitized about IPT. However, this is probably compensated by the fact that in the context of the study, a specific study questionnaire was filled, which would not be done in routine conditions. Patients with a positive TB symptomatic screening were not followed up in Mathare, and it is not known whether these patients were later on referred for TST in case the TB investigations were negative. These potential additional patients could have increased the inclusion rate but probably not impacted the study results. Our study did not assess the cost of the introduction of the TST-based screening. Further evaluation of the cost–benefit of using a more targeted long-term IPT strategy compared with a broad 6-month IPT strategy is necessary.

CONCLUSION

The results from this study show that implementing TST-based strategy for IPT initiation in HIV-positive patients was feasible and acceptable in both urban and rural resource-constrained settings. The broad implementation of this strategy would allow patients who can benefit the most to receive longer-term isoniazid therapy (36 months instead of 6

months) and would avoid unnecessarily treating a significant number of patients who do not stand to benefit.

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