

The feasibility of a public-private mix program on pulmonary tuberculosis screening in Penang: A pilot study

Wei Shuang Tang, Mei Wai Chan, Fei Ping Kow, Ranjini A/P Ambigapathy, Justen Han Wei Wong, Vasantha Thiruvengadam, Umarazina bt Abd Kadir, Anita Jain, Ramesvari Pararajasingam Pillai

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Authors:

Chan Mei Wai

(Corresponding author)
MBBS (UM), FRACGP
RCSI&UCD Malaysia Campus
Georgetown, Penang
email: chanmw@rcsiucd.edu.my

Tang Wei Shuang

MBBS (UM), Master in Family
Medicine (UM)
Jalan Perak Health Clinic

Kow Fei Ping

MBBS (Manipal, India) Master in
Family Medicine (UM)
Jalan Angsana Health Clinic

Ranjini A/P Ambigapathy

MBBS (UM), Master in Family
Medicine (UM)
Sungai Dua (Timur Laut) Health Clinic

Justen Wong Han Wei

M.D. (UPM), Master in Public Health
(UM)
North East District Health Office

Vasantha Thiruvengadam

MBBS (Manipal, India),
Master in Public Health (UM)
North East District Health Office

Abstract

Background: The low detection rate of tuberculosis (TB) cases in Malaysia remains a challenge in the effort to end TB by 2030. The collaboration between private and public health care facilities is essential in addressing this issue. As of now, no private-public health care collaborative program in pulmonary tuberculosis (PTB) screening exists in Malaysia.

Aim: To determine the feasibility of a collaborative program between private general practitioners (GPs) and the public primary health clinics in PTB screening and to assess the yield of smear-positive PTB from this program.

Methods: A prospective cohort study using convenient sampling was conducted involving GPs and public health clinics in the North-East District, Penang, from March 2018 to May 2019. In this study, GPs could direct all suspected PTB patients to perform a sputum acid fast bacilli (AFB) direct smear in any of the dedicated public primary health clinics. The satisfaction level of both the GPs and their patients were assessed using a self-administered client satisfaction questionnaire. IBM SPSS Statistical Software was used to analyze the data.

Results: Out of a total of 31 patients who underwent the sputum investigation for PTB, one (3.2%) was diagnosed to have smear-positive PTB. Most of the patients (>90%) and GPs (66.7%) agreed to continue with this program in the future. Furthermore, most of the patients (>90%) were satisfied with the program structure.

Conclusion: It is potentially feasible to involve GPs in combating TB. However, a more structured program addressing the identified issues is needed to make the collaborative program a success.

Introduction

Tuberculosis (TB) remains one of the top 10 causes of death globally.¹ The World Health Organization (WHO) has pledged to end the TB epidemic by 2030.² Despite the global decline of the disease burden, the moderate rate of decline reported in 2015 at 2% per year² is too low to achieve the predetermined milestones of the End TB Strategy.¹ Hence, the Stop TB Partnership has recommended that countries should strive to achieve an annual case decline rate of 10% in 2025.² In order to accelerate progress, the Global Plan articulates three people-centered targets called 90-(90)-90 targets (reach 90% of all people who need TB treatment, including 90% of people in key populations, and achieve at least 90% treatment success).³ The Global Plan proposes to achieve the 90-(90)-90 targets by 2025 at the latest to meet the goal of ending TB by 2030.³

Finding the “missing people” remains a major challenge in TB control.² In 2018, only 7 million TB cases were documented globally, in contrast to estimated TB cases of 10 million people.¹ Such figures indicate that 3 million people were not diagnosed, treated, or officially registered by national TB programs.² A systematic review linked health care delay to deferred diagnosis and treatment of tuberculosis, including that caused by seeking traditional healers or practitioners⁵ and private general practitioners first.^{5,6} Moreover, many private general practitioners are delinked from the country’s tuberculosis control efforts, which also contributes to the discrepancy between reported and estimated cases.⁷

The collaboration between the private and government sectors plays a vital role in achieving effective TB control, especially in countries where a large proportion of care-seeking entails private providers. Hence,

Umarazina bt Abd Kadir

M.D.(UKM) Master in Public Health
(UM)
North East District Health Office

Anita Jain

M.D. (India), Master in Family
Medicine (UKM)
Jalan Macalister Health Clinic

Ramesvari Pararajasingam Pillai

M.D.(UNIMAS), Master in Family
Medicine (UKM)
Jalan Perak Health Clinic

the involvement of all related health care personnel in TB care through the public-private mix (PPM) approach is a crucial element of the WHO End TB Strategy.⁸ Evidence has shown that PPM programs had improved case detection, treatment outcome, and management of TB among countries that adopted this approach.⁹

Malaysia is considered a country with an intermediate incidence rate of TB with 93 per 100,000 population in 2018.¹⁰ In 2014, the estimated incidence rate for Malaysia was 103 per 100,000 population, while actual detected cases were 81 per 100,000 population. Potentially, about 6,000 cases remained undetected in the country.¹¹ Based on the National Strategy Plan (NSP) for TB, the estimated annual underrepresentation of TB cases is 13.49% (95%CI: 10.39-15.34).¹¹ It is crucial to close the gap between estimated incidents and identified patients. Therefore, enhanced case detection is a key strategy in the NSP for TB (2015-2020).¹¹ Accordingly, the NSP plans to increase case notification of all forms of TB from 79 per 100,000 population in 2015 to 100 per 100,000 population in 2020.¹¹

Patients can choose to receive medical care from private or government health facilities in Malaysia. Public health facilities are government-funded institutions where patients pay a nominal fee.¹² In comparison, in private health facilities, patients must bear the full cost of health care services.¹² When a private general practitioner suspects a patient might have pulmonary tuberculosis (PTB), the patient can either be subjected to a sputum test or chest radiography at a private facility or be referred to a government primary health clinic for further investigation. However, in the current referral system, patients who are referred to government facilities must register at the facility and be re-examined by a doctor before having further investigation performed involving the diagnosis of PTB. This time-consuming referral process may be a factor in noncompliance with the management plan. Thus, both financial and time factors may become roadblocks for a symptomatic patient to seek PTB investigation. The situation is even more challenging when patients are not fully convinced of the possibility of a diagnosis of PTB or its severity if left untreated due to lack of symptoms.

Besides issues from patients, deferment in the diagnosis and treatment of TB in Malaysia

could reflect low awareness of the disease among private general practitioners (GPs) 13 or be due to limited access to chest radiography and sputum examination in private health clinics compared to hospitals and government health clinics.¹³

In view of the importance of public-private collaboration to fill the gap on the issues that patients and general practitioners may face in Malaysia, this study aims to look into the feasibility of a collaboration program with general practitioners for PTB screening and assess the yield of smear-positive PTB from this program.

Methodology*Study design and participants*

This investigation comprised a prospective cohort study conducted from March 2018 to May 2019 in selected private primary health clinics in the North-East District, an urban district in Penang, Malaysia. The inclusion criterion was a private primary health clinic with solo practice. Practitioners in group practices were excluded from this study.

A total of 11 private GPs were invited via convenience sampling to participate in this study. A participant information sheet was distributed to the GPs, and written consent was obtained from all participants.

Program development

The researchers initiated this program with the permission of the district health officer. Meetings were conducted involving the district health officer and the researchers. Initial program development included discussions regarding the flow of the intervention pathway. The relevant parties involved, such as the laboratory assistants and nurses, were invited to give opinions during the development of the pathways.

The researchers informed the participating GPs about the flow of the intervention pathways. All participating GPs were provided with a poster to be displayed at their respective clinics, standard national TB investigation forms, a client satisfaction questionnaire, and sputum containers. The displays were used to create TB awareness among the patients who visited the selected clinics.

Program overview

Figure 1 shows the interventional pathway and the conventional pathway. In this program, the participating GPs were given the authority to order a sputum acid fast bacilli (AFB) test from laboratories at public primary health clinics. During the study period, all Malaysians who presented any of the symptoms suggestive of PTB: cough (≥ 2 weeks), night sweat/ fever/ loss of weight (≥ 1 month), or hemoptysis were offered to have their early morning sputum checked at the nearest public primary health clinic. The GPs provided each patient a signed TB investigation form, an awareness pamphlet on TB, a leaflet on the correct technique for sputum collection, and a sputum container. The laboratory assistant gave the patient a new sputum container once the patient sent their previous sputum container to the laboratory at a public primary health clinic. Three consecutive days of sputum were collected and tested for AFB. In this program, patients bypassed the conventional pathway in that they were not required to register and be re-examined by doctors in public primary health clinics. Furthermore, the patients saved time and money by not performing the investigations in private laboratories, hospitals, or clinics. Lastly, the patients rated their experience in this program on the client satisfaction questionnaire.

The laboratory assistants informed the researchers regarding the results of the tests. The researchers in turn disclosed the results to the respective GPs via email or phone call. The GPs gave all patients a date to review their results, and patients were allowed to decide on the referral site for further PTB management if the result was smear-positive for the sputum AFB.

Before the program began, a briefing on the flow of this interventional pathway was given to all laboratory assistants and nurses involved in the public primary health clinic.

At the end of the study, the researchers conducted interviews with all the GPs, and the GPs recorded their experience with the program on the client satisfaction questionnaire.

Study Instrument

Patients

The researchers used two instruments to collect data from the patients. The first instrument

was the standard national TB investigation form. This form was used widely in the public primary clinic to order an investigation for sputum AFB. The sociodemographic characteristics of the patients were obtained from this investigation form.

The second instrument was the self-administered client satisfaction questionnaire. The researchers developed a self-administered client satisfaction questionnaire based on example of online customer/client satisfaction questionnaires and modified this tool to suit the current study. It consisted of 5 items that assessed the participants' satisfaction regarding this program. A 5-point Likert scale was used to rate the extent of satisfaction for each item.

Face validation was conducted, and amendment was done based on feedback. The researchers conducted forward and backward translation to the Malay language and the questionnaire was pilot-tested on 10 subjects who were not part of the study population.

General practitioners

The same self-administered client satisfaction questionnaire (with item 5 removed) was used to assess the level of satisfaction among the GPs. At the end of the study, the researchers conducted interviews to gather information from the GPs on sociodemographic characteristics, barriers that the GPs identified, and suggestions to improve the program.

Program evaluation

Program implementation was evaluated using the following measures: satisfaction scoring from the GPs/ patients and the number of patients screened as positive for sputum AFB.

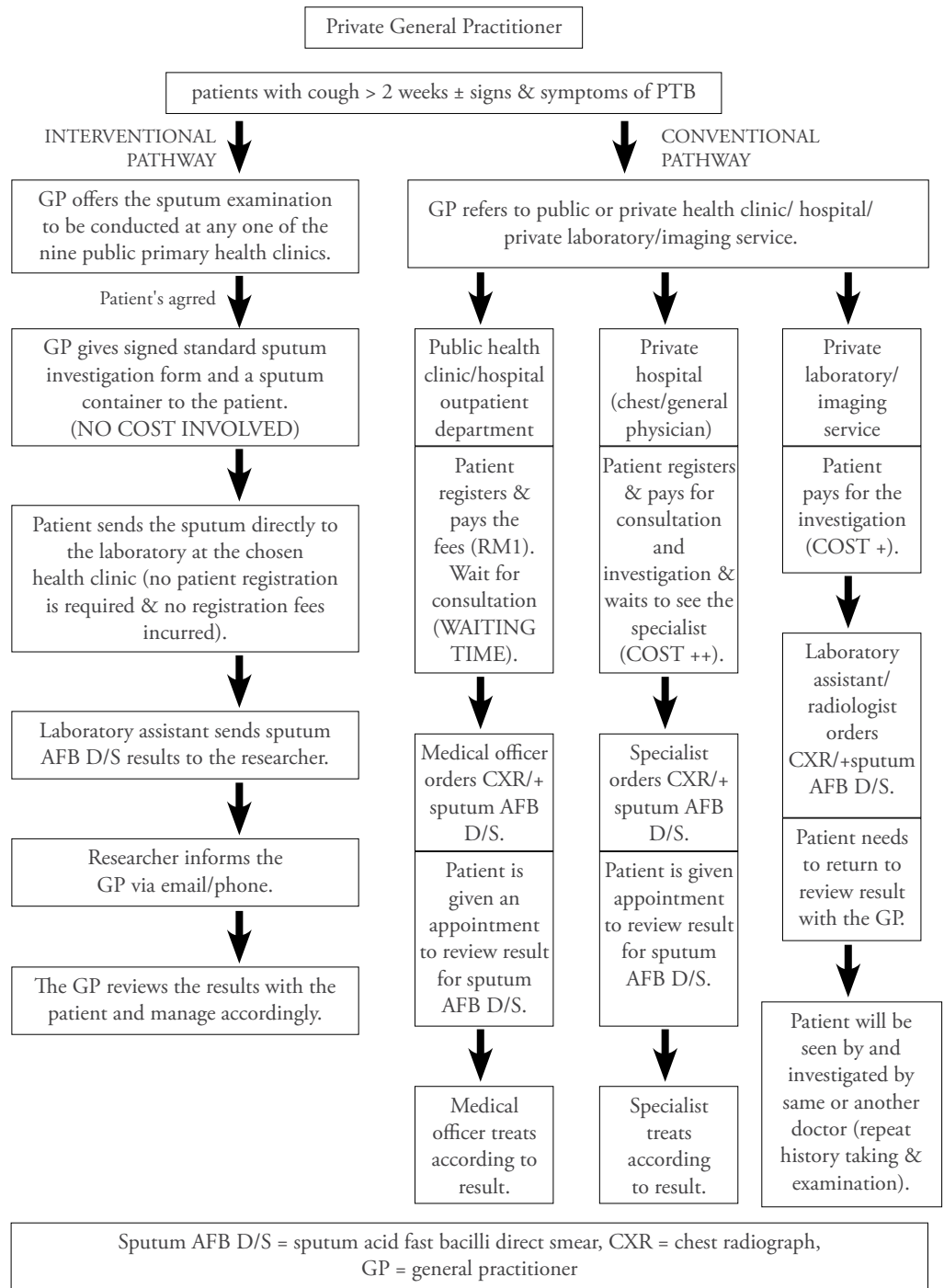
Ethical consideration

The study was approved by the Medical Research Ethics Committee, Malaysia (NMRR-17-2120-37648) on October 27, 2017.

Data analysis

The data were entered into Microsoft Excel and imported into IBM SPSS Statistical Software, version 25 for analysis. Descriptive statistics were used to define the sociodemographic profile of the participants. Numerical variables such as mean and standard deviation for age were also displayed. The categorical variables such as sex were displayed as actual numbers

Figure 1 The flow comparing the interventional pathway with the conventional pathway



and percentages.

The GPs' and patients' satisfaction scores for this program were analyzed. A 5-point Likert scale with 1 defined as very dissatisfied/strongly disagreed/very unlikely whereas 5 defined as very satisfied/strongly agreed/very happy was used to evaluate participants' satisfaction on the following questions:

i. Overall, how satisfied are you with the sputum investigation arrangement?

ii. Based on your experience with this arrangement, how likely are you to recommend this to your friends who may need to send sputum for investigation for tuberculosis?

iii. Based on your experience with this arrangement, would you agree that this arrangement should be continued in the future?

iv. Based on your experience with this arrangement, do you recommend this

- arrangement to be extended to other private general practitioners?
- v. Do you feel happy when you are called back to review your results?
- A score of 1 or 2 was re-categorized as disagreed/dissatisfied/unlikely, while a score of 4 or 5 was re-categorized as agreed/satisfied/likely. A score of 3 was neutral.
- Barriers and suggestions gathered about improving the program were used in the discussion session.

Results

Eleven eligible GPs were invited to participate in this study. Of these, only nine GPs agreed and consented to the study.

Table 1 shows the sociodemographic characteristics of the nine participating GPs. Nearly half of the participating GPs were senior, having more than 40 years of experience in practicing as a doctor and as a GP.

Table 1. Sociodemographic characteristics of the participating general practitioners (N=9)

| Sociodemographic characteristics | Frequency (percentage) |
|---|------------------------|
| Numbers of years in practice | |
| 1-10 | 0 (0) |
| 11-20 | 5 (55.6) |
| 21-30 | 0 (0) |
| 31-40 | 0 (0) |
| 41-50 | 4 (44.4) |
| Numbers of years as general practitioner | |
| 1-9 | 1 (11.2) |
| 10-19 | 4 (44.4) |
| 40-49 | 4 (44.4) |

Out of nine GPs, only five GPs sent their patients to the public primary health clinic to perform a sputum AFB investigation.

Table 2 shows the sociodemographic characteristics of the patients who sent in their sputum sample. A total of 31 patients sent a sputum sample. The mean age of the participating patients was 52.4 (± 16.85). From the total number of patients, one was diagnosed to have smear-positive PTB.

Table 2. Sociodemographic characteristics of the participating patients (N=31)

| Sociodemographic characteristics | Frequency (percentage) |
|--|------------------------|
| Gender | |
| Male | 14 (45.2) |
| Female | 17 (54.8) |
| Age in years (mean \pm SD) | |
| 1-20 | 2 (6.5) |
| 21-40 | 6 (19.4) |
| 41-60 | 13 (41.9) |
| 61-80 | 10 (32.2) |
| Results of sputum AFB smear | |
| Positive | 1 (3.2) |
| Negative | 30 (96.8) |

Table 3 and **Table 4** contain feedback from the GPs and patients collected from the clients' satisfaction questionnaire. Most of the patients were satisfied with the arrangement (90.3%), agreed to recommend this arrangement to others (90.3%), agreed to continue this program (93.5%), or agreed to extend this program to other GPs. The responses from the GPs varied. Only one-third of the GPs were satisfied with the arrangement. Two-thirds of the GPs agreed to recommend this arrangement to others (66.7%), agreed to continue this program (66.7%), or agreed to extend this program to other GPs.

Table 3. Responses on the “clients’ satisfaction questionnaire” from general practitioners (N=9)

| Statements | Agreed/Satisfied/ Likely Frequency (percentage) | Neutral Frequency (percentage) | Disagreed/ Dissatisfied/ unlikely Frequency (percentage) |
|--|--|--------------------------------------|--|
| Overall, how satisfied are you with the sputum investigation arrangement? | 3 (33.3) | 4 (44.5) | 2 (22.2) |
| Based on your experience with this arrangement, how likely are you to recommend this to your colleagues who may need to send patients for sputum investigation for tuberculosis? | 6 (66.7) | 0 | 3 (33.3) |
| Based on your experience with this arrangement, would you agree that this arrangement should be continued in the future? | 6 (66.7) | 0 | 3 (33.3) |
| Based on your experience with this arrangement, do you recommend this arrangement to be extended to other private general practitioners? | 6 (66.7) | 0 | 3 (33.3) |

Table 4. Responses on the “clients’ satisfaction questionnaire” from patients (N=31)

| Statements | Agreed/Satisfied/ Likely Frequency (percentage) | Neutral Frequency (percentage) | Disagreed/ Dissatisfied/ unlikely Frequency (percentage) |
|--|--|--------------------------------------|--|
| Overall, how satisfied were you with the sputum investigation arrangement? | 28 (90.3) | 2 (6.5) | 1 (3.2) |
| Based on your experience with this arrangement, how likely are you to recommend this to your friends who may need to send sputum for investigation for tuberculosis? | 28 (90.3) | 1 (3.2) | 2 (6.5) |
| Based on your experience with this arrangement, would you agree that this arrangement should be continued in the future? | 29 (93.5) | 0 | 2 (6.5) |
| Based on your experience with this arrangement, do you recommend this arrangement to be extended to other private general practitioners? | 29 (93.5) | 0 | 2 (6.5) |
| Do you feel happy when you are called back to review your results? | 28 (90.3) | 1 (3.2) | 2 (6.5) |

Discussion

Most patients (90.3%) provided positive feedback on the program. In other words, the patients were satisfied and happy with the program. Similar feedback was observed in other studies.^{14,15} In 2017, a population-based cross-sectional survey was carried out in Pakistan examining the satisfaction levels of TB patients about the New Funding Mechanism (NFM) of the PPM model¹⁴ in which private health providers were given financial incentives

to support their consultation time during the course of treatment. The study recruited 576 patients, all of whom went through a “patient satisfaction survey tool.” A total of 82% of the patients were satisfied with the PPM program.¹⁴ However, only one-third of the GPs were satisfied with the arrangement. Similar findings were observed in a study in Delhi, India.¹⁵ In comparison, the current study used a “referral model” (suspected TB patients were referred to the public primary health clinic for investigation of TB) to facilitate the diagnosis

of PTB. Like the previous studies, the GPs who participated in the current study were not satisfied with such an arrangement because some of their patients felt that it was still troublesome despite the minimal cost involved. Based on the feedback, a model that involves a porter system where transportation of sputum samples is arranged may increase the uptake of the test among eligible patients. Supporting this suggestion, an innovative PPM model in Vietnam that offered onsite TB testing or a similar porter system revealed positive results in reducing the gaps and delays in testing.¹⁶

Among the nine GPs in this study, only five referred patients to participate in this program. In general, private health clinics differ in their respective patient profiles, clinic locations, or business models. These differences might contribute to the readiness of the GPs to send eligible patients for investigation via this program. Hence, the process of mapping the GPs is an important step to identify suitable GPs to participate before the start of such a program.⁵ During this mapping process, GPs with larger practices or locations with a higher TB burden or poor access to health services may be prioritized.

The number of patients who participated in this program was not very encouraging. Out of 31 patients, one patient (3.2%) was diagnosed as having sputum positive PTB. Compared to similar studies of the PPM program,^{9,17} case detection numbers are low. In general, engaging all care providers through a PPM program could increase the case detection up to four-fold and promise an excellent treatment outcome.¹⁸ In 2014, a systematic review of PPM for TB care and control identified 78 studies on 48 programs in 16 countries.⁹ Of the 78 studies, 41 studies reported an increase in case detection numbers or rates to some extent.⁹ A study in Ho Chi Minh City assessing case detection after implementing a PPM program reported that case detection increased 18% compared to pre-PPM program and was higher compared to a district with no PPM program.¹⁷ However, PPM is not equally effective in all high-burden countries. PPM will perform well in countries where the private and other sectors are influential in the health system.¹⁸ Malaysia is a country with an intermediate burden of TB, and only 5% of the country's TB patients have been under the care of private health providers.⁵ These factors might have contributed to the low case detection in the current study.

The lower numbers for participation might be attributed to the poor compliance of the GPs or patients with the suggested diagnostic algorithm. The number of tests offered was low. During the interview session with the GPs, the decision regarding PTB screening is not only based on duration of cough,^{19,20} but doctors also look at other supportive symptoms, such as the presence of hemoptysis, night sweats, and fever. This practice is slightly different from that of the government health clinics, where any patients with two weeks of cough will be subjected to sputum examination with or without chest X-ray.

The current study had several identified limitations. First, this investigation was a pilot feasibility study that only involved nine selected GPs in the North-East District in Penang. Thus, the low case detection cannot be generalized to the study population. Second, no documentation was recorded on the number of patients that refused to join the program. As a result, we are not able to compare the effectiveness of this PPM program with other programs. Third, in this study, the researchers excluded non-Malaysians due to the local fee-related regulation. In Malaysia, a research investigation by Liew SM et al.²¹ reported that among patients who were diagnosed with PTB, 14.2% were non-Malaysians. Another study similarly reported that immigrants who stayed in a high-TB-intensity environment might worsen PTB infection progression.²² Fourth, the client satisfaction questionnaire was not validated. Lastly, an interview was carried out to assess the GPs' opinions but lacked proper statistical analysis. A future study should look into this aspect using qualitative research methods.

The strength of this study is that it represents a pioneer collaboration in line with the PPM approach for sputum AFB direct smear screening in Malaysia. This study can be further expanded to involve more GPs in the area with some adjustment to the arrangements, especially in terms of implementing the suggested porter system to transfer the specimens from the involved GP clinics and looking into the possibility to facilitate TB screening among immigrants. This pilot study thus acts as a vanguard for other researchers or stakeholders to develop a more structural approach involving GPs in the efforts to screen and treat TB earlier, with the eventual goal of eliminating TB.

In conclusion, it is potentially feasible to have the PPM program for TB screening in Penang, Malaysia. However, more efforts are needed to look into patients' preferences, the dynamics of private practice, and the role of private health workers in the care of TB to develop a more effective PPM program in Malaysia.

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Competing interest

The authors declared that there were no competing interests.

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How does this paper make a difference to general practice?

- This investigation comprises a pilot study carried out on the Public-Private Mix (PPM) approach in the screening of PTB in Malaysia.
- In view of the modest detection rate, a more structural approach addressing the patient preferences, private sector dynamics, and the rationale for engaging all care providers should be carried out to make the PPM program a success.

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