Insufficient Implementation of Tuberculosis Screening and Prophylaxis in Child Contacts

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Published in:
Pakistan journal of medical & health sciences

Publication date:
2018

ORIGINAL ARTICLE

Insufficient Implementation of Tuberculosis Screening and Prophylaxis in Child Contacts: a Situational Analysis

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ABSTRACT

Background: Contact investigations and chemoprophylaxis are proven cost-effective and safe means to reduce TB-related morbidity and mortality in children living with pulmonary tuberculosis (PTB) cases.
Aim: To evaluate the implementation of tuberculosis (TB) screening and chemoprophylaxis in child contacts of smear-positive adult TB cases, and to identify practical barriers experienced by the staff of community health centers (CHCs) in a rural area in Central Java, Indonesia.
Methods: Firstly, a short questionnaire was used to collect information on whether children in the household were screened and received chemoprophylaxis through home visits or at the CHC. Secondly, semi-structured interviews and an FGD were performed with the TB officer, a nurse responsible for the TB program activities, the assistant of the TB officer, a medical doctor from the out-patient clinic, and the head of the CHC. The data was then independently analyzed using the theoretical thematic analysis, then the findings were compared and integrated into one set of themes.
Results: Out of 67 child contacts, determined through record reviews and visits of smear-positive TB patients, only 5(7.5%) were screened. None was started on chemoprophylaxis. In-depth interviews and a focus group discussion with CHCs' staff identified shortcomings in organization and management of care, lack of awareness and knowledge among staff, limited understanding of caregivers, and practical obstacles related to the rural setting.
Conclusions: A comprehensive approach is needed that matches these site-specific practical barriers and might require a redistribution of organizational power from health authorities to the CHCs.
Keywords: TB contact, children, screening, chemoprophylaxis

INTRODUCTION

It is only in recent years that more attention is drawn on the burden and impact of childhood tuberculosis (TB). Children usually get infected with the Mycobacterium tuberculosis by adult pulmonary TB (PTB) cases in their closest surroundings, i.e., parents or other household members. Particularly in children under 5 years of age (under-fives), bearing an underdeveloped immune system, the risk of progression to active disease after primary infection is high[1,2]. Contact investigations and chemoprophylaxis with isoniazid preventive therapy (IPT), are proven cost-effective and safe means to reduce TB-related morbidity and mortality in children living with PTB cases[3].[3]IPT can reduce the risk of developing active disease from primary (asymptomatic) infection by 60-65% over 2 years or longer[3].

In Indonesia, where TB remains a major public health challenge, 8.47% of the 328.824 newly diagnosed patients in 2012 were under the age of 15 years, exceeding the global average of 6% of TB cases that occur in children[4]. The Indonesian national TB control program (NTP) recommends screening of all child household contacts (in particular under-fives) of smear-positive PTB cases using the Indonesian scoring system for TB diagnosis in children[5].

Different from the WHO recommendations (Fig. 1), this scoring system requires tuberculin skin test (TST) and chest-X-ray (CXR). If TB disease is excluded (i.e. score <6), under-fives should receive a 6-month IPT (5-10 mg/kg bodyweight daily),[5]which in line with the present WHO recommendations[6] (Fig. 1). Current recommendations recommend 10mg/kg per day for 6 months[7].

A systematic review showed an overall prevalence of TB infection ranging from 24.4 to 69.2% in children (<15 years) living with a smear-positive TB case in South East Asia[8] Despite the benefits of screening and chemoprophylaxis in child contacts, numerous studies from high TB burden countries indicated that these measures are often poorly implemented[9-11]. A cross-sectional study in 4 TB units in South India, for example, showed that only 14% of 84 child contacts under 5 years had been screened for TB disease, and only 19% had been initiated on IPT with no follow-up. Focus group

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discussions (FGDs) among the staff revealed that there was an overall lack of awareness and knowledge about the procedures. Also, there was inefficient documentation and evaluation of the children on IPT to assure compliance[12]. Qualitative research like this is scarce, but essential to be able to improve implementation and, where necessary, adapt policies to increase their practicability.

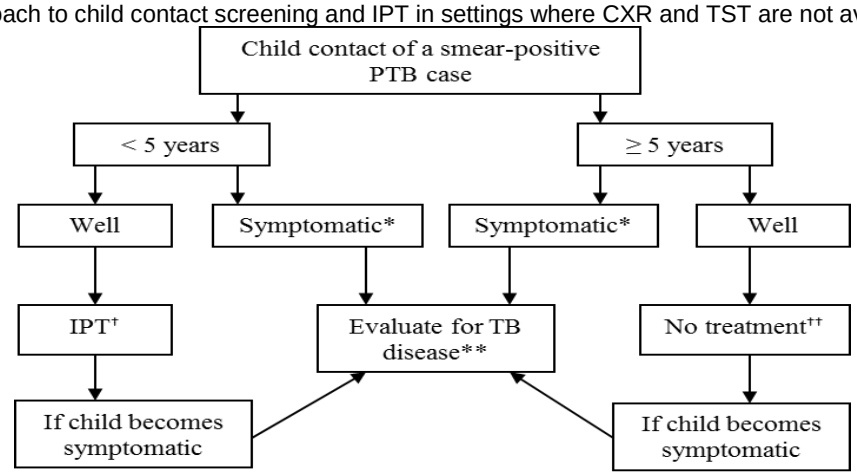
There is no published data on the implementation of child contact screening and chemoprophylaxis in community health centers (CHC, Indonesian acronym: Puskesmas) in Indonesia. This study aims to evaluate the current practices of TB screening and chemoprophylaxis in child contacts in CHCs in the district of Jepara in Central Java, Indonesia, and to identify practical barriers experienced by the staff.

Table 1. The Indonesian Pediatric TB scoring system.[5]

Variable	0	1	2	3
Household contact	Unknown		Contact with smear-negative TB patient or unknown sputum smear result	Contact with smear-positive TB patient
Tuberculin skin test (TST)	Negative			Positive (> 10 mm; in immune compromised children > 5 mm)
Nutritional state		BW/age < 80%	Severe malnutrition (BW/age < 60%)	
Fever of unknown origin ≥ 2 weeks		Present		
Cough ≥ 3 weeks		Present		
Lymphadenopathy (cervical, axillary, inguinal)		Multiple, non-tender (Ø ≥ 1 cm)		
Joint swelling (knee or phalanges)		Present		
Chest X-ray	Normal	Suggestive of TB		

Abbreviations: BW: body weight; TB: tuberculosis.
Notes: Positive TB diagnosis if total score ≥ 6 (by doctor); BW based on present BW; fever and cough relevant if no response to standard therapy; CXR is not considered to be a main diagnostic tool; evaluated for accelerated BCG reaction (< 7 days); hospital referral to be made for children < 5 years old if score > 5 or strong suspicion for TB; IPT to be prescribed for score < 6 if positive history of household contact

Fig. 1: WHO approach to child contact screening and IPT in settings where CXR and TST are not available.[6]



Abbreviations:
IPT: Isoniazid preventive treatment; PTB: Pulmonary tuberculosis; TB: Tuberculosis.
*Symptoms suggestive for TB are e.g. cough >21 days, fever > 14 days,
weight loss or failure to thrive
**: If symptomatic refer to guidelines on diagnosis of childhood TB
†: IPT: Isoniazid 5 mg/kg daily for 6 months,[6]current WHO guideline recommends10mg/kg daily for 6 months.[7]

††: Unless the child is HIV-infected (in which case isoniazid 5 mg/kg dailyis indicated)[6], current WHO guideline recommends 10mg/kg daily for 6 months.[7]

METHODS

Jepara District is a rural area with a population of about 1.1 million. In this district, there are 21 public CHCs, 2 public and 4 private hospitals. Each CHC provides care for around 50.000-100.000 patients with an average of 65 staff members, including 30 to 40 paramedics and 2 to 3 medical doctors. According to the District Health Office, in 2011, the TB case detection rate (CDR) in all district's CHCs and hospitals combined was 42.07%, with a national target of 70%.

For this study, 3 CHCs in the villages Mlonggo, Pakijs Aji, and Bangsri were selected based on an existing collaboration with the Faculty of Medicine, Diponegoro University in Semarang.

Data sampling took place in November and December 2012. First, a retrospective record review was conducted to assess to what extent screening of child contacts and IPT provision took place in these three CHCs. All PTB patients (> 15 years), registered as sputum-smear positive in the CHCs during the period of November 2011 until November 2012, were included. A 'sputum smear-positive PTB patient' was defined as newly or retreated patient with at least 2 sputum smear microscopy positive for acid-fast bacilli (AFB), or 1 sputum smear microscopy positive combined with radiographic abnormalities consistent with active pulmonary TB disease. Because no written documentation regarding child contact screening or IPT was found, the selected PTB patients were visited by author JKS accompanied by a local research assistant as guide and translator. A short questionnaire was used to collect information on whether children in the household were screened through home visits or at the CHC and whether they had received IPT.

Secondly, semi-structured interviews and a FGD were performed. Four staff members were interviewed at each of the three CHCs: (1) the TB officer, a nurse responsible for the TB program activities; (2) the assistant of the TB officer, who in all cases was a laboratory worker; (3) a medical doctor from the out-patient clinic; (4) and the head of the CHC, a physician also involved in patient care. An additional interview was held with the district TB officer who was responsible for supervising and monitoring the TB control programs in the CHCs in this district. The interviews were carried out by JKS as interviewer (fluent in English) and ABH as translator (native in Indonesian and Javanese). The FGD was done with the 3 TB officers and their assistants. It was moderated by ABH and held in Indonesian language. The questions in both, the interviews and FGD, addressed the local practices of TB screening in child contacts and IPT, the interviewee's opinion about it and related practical difficulties. The interviews and FGD were audio-recorded.

Data analysis: The information gathered through patient visits was analyzed using SPSS IBM, version 19. The interviews and FGD were transcribed by author ABH and independently checked for errors by JKS. The transcripts were translated into English. The data was then independently analyzed by JKS and ABH, using the principals of theoretical thematic analysis with a realist approach that acknowledges the reported experiences, meanings and reality of the respondents.1[3]All data items were read repetitively; patterned responses and meanings were identified, manually coded into groups, condensed and evaluated on their relevance and keyness in relation to the research questions, with subordinate emphasis on prevalence. Thereafter, the findings of both researchers were compared and integrated into one set of themes.

Ethics: The research protocol was reviewed and approved by the Ethical Clearance Committee of the Faculty of Medicine of Diponegoro University. Permission was granted by the heads of the involved CHCs. All patients and staff gave written informed consent before participating.

RESULTS

Seventy-five smear-positive PTB patients were identified through the record analysis. The investigators were able to locate and get oral data from 47 patients (Figure 2). Sixty-seven child contacts were determined with a mean age of 6.5 years (Range: 2 month to 15 years, SD 3.8 years). Twenty-four (35.8%) were under-fives. Eight (21.0%) of 38 smear-positive TB patients with children were visited by a staff member of the particular CHC where they were receiving or had received their TB treatment. During none of these visits, children were examined nor were caregivers asked about the presence of symptoms in the children in the house. Of all 67 children, only 5(7.4%) had been screened for TB, but on the caregivers' initiative, including 2 under-fives. None was diagnosed with TB, and none of the 24 under-fives was started on IPT.

In total, 13 interviews and one FGD were performed, after which data saturation was achieved. Four comprehensive themes were identified reflecting the main areas of practical barriers to implement the national recommendations on TB child contact screening and IPT: (1) 'organization and management of care'; (2) 'awareness and knowledge among the staff'; (3) 'understanding of caregivers'; (4) ´rural setting'. These themes will be elaborated on the basis of excerpts of the interviews and FGD.

The staff knew the protocol for the management of adult contacts of sputum smear-positive patients, though said that there was no protocol regarding child contact screening. Respondents thought that child contacts got neglected, because the local TB control strategies were focused on adults.

"TB screening for children is not really the focus here. There is only a policy for TB in adults. The District Health Office (DKK, Indonesian: Dinas Kesehatan Kabupaten) also doesn't have a policy on child contact screening." (Interview lab assistant, CHC 2)

Usually TB screening, diagnosis and treatment in children was done by doctors. According to them, only children with suggestive symptoms got screened, however, in most cases on caregivers' initiative and not as a matter of protocol.

"In fact, we almost never do TB screening in children. We find TB in pediatric patients usually by doing anamnesis for complains regarding the weight. If weight doesn't match with age and height, or if the child had prolonged sub-febrile temperature, then we screen for TB. […] Even for adults, we only screen contacts with chronic cough."(Doctor, CHC 2)

The District TB officer said, the District Health Office (DKK) recommends the CHC to use the Indonesian scoring system for contact screening in children, but admitted that there was indeed no clear protocol. Besides, no reporting of childhood TB cases was done by the CHC, which greatly impaired the DKK's monitoring and supervising role.

High workload: All respondents, especially the TB officers and doctors, mentioned a high workload as barrier. The idea, to also be responsible for the screening of child contacts, seemed impossible to manage to them.

"I think actually there are a lot of child TB cases. But if this responsibility is given to TB officer, it's too much. We would protest. Our workload is too much." (TB officer, CHC 3)

Impracicality of scoring system for TB screening in children: The majority of interviewed doctors expressed difficulties in using the Indonesian Pediatric TB scoring system for screening and diagnosis. In practice, they usually relied on physical examination and laboratory tests, like erythrocyte sedimentation rate and white blood cell differential. If symptoms and laboratory parameters were suggestive, CXR would follow. One of the CHCs had on-site X-ray facilities, the others had to send their patients to the public hospital. In few cases, a child was referred to the hospital for TST, which had only been available for 2 months at the time of data sampling. Hence, none of the interviewed doctors used the scoring system consistently. Often treatment was started solely based on symptoms, and laboratory and radiological findings.

"For TB in children, patients come here with complaints of weight loss or growth altering. Then we advise them to go to lab for differential count. If it is high and leukocytes are high too, then we refer to the hospital for an X-ray. When the lab and X-ray is positive for TB, we can start treatment." (Doctor, CHC 2)

Because the Indonesian Pediatric TB scoring system had to be done by a doctor, it could not be used by the TB officers to screen child contacts in the current structures, in which they are responsible for contact investigations of smear-positive TB patients through home visits. Also, CXR and TST being necessary for a proper use of the scoring system made screening through home visits rather impractical according to the staff.

Awareness and knowledge among the staff: All respondents said that IPT was not provided in these CHCs. The responses were mixed: some had heard of it, some had used it once and some had doubts about the efficacy; however none of them knew the exact national recommendations**.**

"We never provide it, not yet. We never give prophylaxis treatment. Actually we should give it to TB contacts. But, in my knowledge prophylaxis is still controversial, especially in children. But I do not follow the literature closely." (Head of CHC 3)

The response of the district TB officer regarding IPT showed that there was indeed no specific protocol on IPT, despite the national recommendations.

Understanding of caregivers: According to the staff, people in the village would not understand the importance of screening. TB officers often experienced difficulties in obtaining sputum samples for the screening of adult contacts, and therefore suspected it to be even harder to convince them of the importance of screening children. The staff also thought that it would be difficult to make them understand why their child had to take medication for 6 months without being ill.

"If we want to give the prophylactic therapy we have to provide good education so that they really want to give the medication to their children. Because, if people are not really sick, they don't want to take medication, and they may refuse it." (TB officer, CHC 1)

Rural setting

Lack of transportation and poorly developed infrastructure: The patient population of the CHCs lived in a widespread rural area, with some parts covering a rather hilly and mountainous area. The distances to patients´ houses could be far – up to 1 hour scooter drive, and were often only accessible by motorcycle because of poor conditions of the roads. This made home visits for contact screening time consuming and difficult to integrate in an already

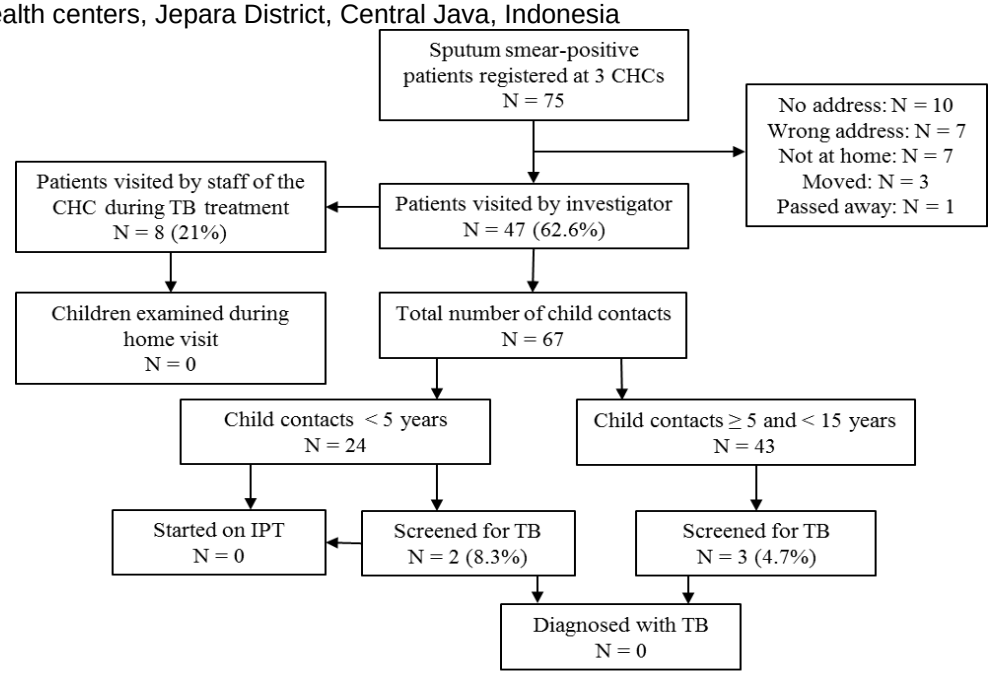
overloaded work schedule. Moreover, respondents thought this would compromise the patients´ ability and willingness to bring their children to the CHC for TB screening.

"We have quite a widespread work area, so there's a transportation problem. […] There is no public transportation and some roads are in poor condition. It's difficult to come with own transportation. So it's difficult for patients to come to the Puskesmas (auth.: CHC)." (TB officer, CHC 2)

Financial burden for caregivers: Caregivers would often refuse to do CXR or TST because of the financial burden. Patients had to pay for laboratory investigations, X-ray and TST, unless they had the Indonesian government health insurance for the poor people (Jamkesmas). Caregivers would often only agree with laboratory test, which impaired the doctors´ ability to follow the guidelines.

"Because it (auth.: TST) is only possible since 2 months, I've only sent two patients so far to the public hospital, because if I tell them 'you have to pay about 80.000 rupiah', they say 'if I go to the hospital, I have to pay even more money, for bus, for transportation´." (Doctor, CHC 1)

Fig. 2.Contact screening andchemoprophylaxis in childhood contacts of sputum smear-positive TB patients in community health centers, Jepara District, Central Java, Indonesia



DISCUSSION

This study shows that child contacts, and most alarmingly under-fives, of sputum smear-positive adult TB patients were not adequately managed in these CHCs. Only 5 out of the 67 child contacts were screened, yet all on caregiver's initiative; none of the CHCs provided IPT. This is a missed chance to effectively prevent potential TB childhood cases and the accompanying burden for the child as well as for the CHCs and the community.

One of the crucial practical barriers found was the absence of a protocol. Neither the head of the CHCs nor the District TB Health Officer had provided any guideline or information on this matter. Consequently, the staff lacked knowledge about the procedures and its potential benefits, and was not aware of the need to put this into practice. Previous research had observed the lack of knowledge and awareness among staff as a barrier too, even in settings where protocols were present[9,12]. That shows that the presence of a protocol alone is not sufficient. In order to successfully implement a policy, the staff needs to be well-informed and trained. Not only to be able to perform the measures, but more so to understand the need for the new tasks they have to take on.

Similar to findings in other studies, [14-15]the necessity to do CXR and TST was perceived as great obstacle. It created operational problems due to time and financial costs for the caregivers and made the Indonesian Pediatric TB scoring system impractical for the staff. Among the suggested solutions to improve the implementation of TB child contact screening and IPT, the WHO approach is the most recommended in the literature[7,14,16]. The advantage of this 'symptom-based approach' over the 'Indonesian Pediatric TB scoring system' is, that clinical

evaluation only is used to identify symptomatic children. Therefore, only those who show symptoms get referred for a CXR or TST, whereby the number of these costly and time consuming investigations gets reduced. It is also easier to be implemented in a setting where doctors are scarce, as the screening can be done by a nurse, e.g. in this case the TB officer[6].

However, even after introducing a protocol and following the WHO approach, difficulties related to the limited understanding of caregivers and the rural settings, e.g., long distances to health facilities, will still be present, as observations in quantitative studies have shown[10,15]. The challenges related the rural settings are probably less controllable by actions of the CHCs or one of the other health institutions compared to the other barriers. Though, they still have to be taken into account when drafting a protocol. The understanding of caregivers on the other hand, may be enhanced more directly, e.g. through education campaigns for patients and caregivers organized by the CHCs. With a better understanding, the community might also start to see the need for the screening and preventive treatment in TB child contacts. This could offer enhancement for the development and success of a more practical protocol, for example through better collaboration between caregivers and health care workers.

In practice though, all this appears rather complex to achieve. In this study, the DKK is the one in charge of the allocation of human resources in the CHCs, and determines and monitors the policies and programs implemented. That means it is within the DKK´s power to introduce a protocol that fits to the site-specific circumstances and challenges, to allocate more staff and to provide the necessary tools and training. The DKK depends on the management of the Province Health Office, which again receives instructions from the highest level, the Ministry of Health. Hence, in order to introduce the WHO approach for TB screening in child contacts, for instance, it requires action on the level of the Ministry of Health. The same presumably applies for government funding for the national TB control program, which is needed to take all the other necessary steps described before. Based on the results of this study and applicability for other high TB burden settings, it seems that a successful implementation of TB child contact screening and IPT in CHCs and clinics in rural areas in general, is largely dependent on the different managing institutions above them and their respective level of bureaucracy.

The CHCs had little financial means and managerial power themselves. Still, it was their staff that was the most aware of all the challenges in the daily practice in the CHCs. They knew the exact 'in-field' situation and would probably have the best ideas about how a program should look like in order to be implementable in such a setting. Therefore, one could argue that one solution to this policy-practice gap might be to give the CHCs more organizational power and resources, so that they are able to develop and set up a well-working screening and IPT provision program for TB child contacts themselves. Of course still in collaboration with and under some supervision of the DKK, but with more autonomy. A potential positive side-effect is that with power also responsibility grows. Thereby failings of the implementation of a protocol can no longer only be blamed on bureaucratic barriers. How to achieve this rather fundamental change on the organizational level in the public health sector though, goes beyond the scope of this study. Further research on the organizational structures and potential bureaucratic obstacles among the different public health institutions might provide valuable information to develop an effective strategy.

Besides this, one can conclude that site-specific investigations are in any case essential to develop programs that are feasible in practice, as other authors already suggested.[17]By identifying the individual practical barriers, those obstacles can be addressed more directly and efficiently. A situational analysis, as done in this study, may be the first step in such a process.

The limitations of this study are a small sample size in the quantitative data, which might restrict the generalizability of the results slightly. Also, the sampling was done through patient interviews, which bears a certain risk of recall bias. The patient visits and interviews with the staff were held in English and needed the assistance of a translator. This might have influenced the natural flow and thereby impaired the depth reached in the interviews. Despite these limitations, no major discrepancies were found between findings in this study and the research published so far.

CONCLUSION

In order to improve the implementation of TB screening and IPT in child contacts in these CHCs in a rural area in Indonesia and similar high TB burden and resource limited settings, a comprehensive approach is needed that incorporates the local practical challenges and resources available. The more simple symptom-based approach of the WHO may be a reasonable option to be considered by the Indonesian Public Health authorities. But also changes in the existing TB program structures, in resource allocation as well as training for the TB

health workers and education campaigns for patients and caregivers are needed. To achieve this, a redistribution of organizational power from higher institutions to the community clinics might be another necessary step to take to enable the staff to use their 'in-field' knowledge and to develop a protocol on TB child contact screening and IPT that overcomes the site-specific barriers and will actually be implemented sufficiently.

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