

## 〈教育報告〉

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第2チーム

### Risk Assessment on TB Transmission in Health Center Settings of Marikina and Paranaque Cities, Philippines

#### フィリピン国マリキナ市及びパラニャケ市の保健所における 結核感染のリスク評価

Team No.2

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## I. Introduction

### 1. Background

The risk of transmission of *M. tuberculosis* from individuals with TB to other patients and to health care workers (HCWs) has been recognized for many years. This risk is high in health facilities especially in many low- and middle-income countries (LMICs). In view of these challenges, the WHO developed Infection Control (IC) Guidelines, which have three levels of IC measures: administrative, environmental, and personal respiratory protection.<sup>1)</sup>

Being considered as one of the 22 countries with high burden of TB<sup>1)</sup> and the apparent economic status of the country, the Philippines is not spared by the challenge of high risk of transmission of TB infection in general population and more so in health facilities. Therefore, this study was aimed at assessing the potential risk of TB transmission, by finding out the status of administrative, environmental and personal respiratory protection control measures to prevent TB transmission in the health centers (HCs) of two selected cities in the Philippines, namely Marikina and Paranaque.

### 2. Objectives

The general objective was to assess TB infection control measures in health center settings based on WHO

Guidelines<sup>2)</sup>. Three specific objectives to assess were: 1) administrative TB infection control measures, 2) environmental TB infection control measures and 3) personal respiratory protection measure in health center settings. The conceptual framework as indicated in Figure 1 provided the roadmap for the study.

## II. Methodology

### 1. Study design and subjects

A cross-sectional descriptive study was conducted, using a checklist of TB Infection Control measures. The target was all 33 HCs in Marikina and Paranaque, Philippines, but eventually 32 out of 33 HCs took part in the study. The respondents for the checklist were the heads of the 32 HCs.

### 2. Data collection

The Data collection tools consisted of checklist, interview, and layout drawing. The checklist was used to collect information from 32 out of 33 HCs. One HC was left out because its head could not fill the checklist. Four HCs were visited from which three doctors, four nurses, four midwives, and three medical technologists were interviewed and the layouts of each HC were sketched. In this report, we focused on the results from the checklist only due to limited space. The nine administrative control measures were: 1) Assessment of at-risk settings by three elements, 2) IC plan by six elements, 3) HCW training by five elements, 4)

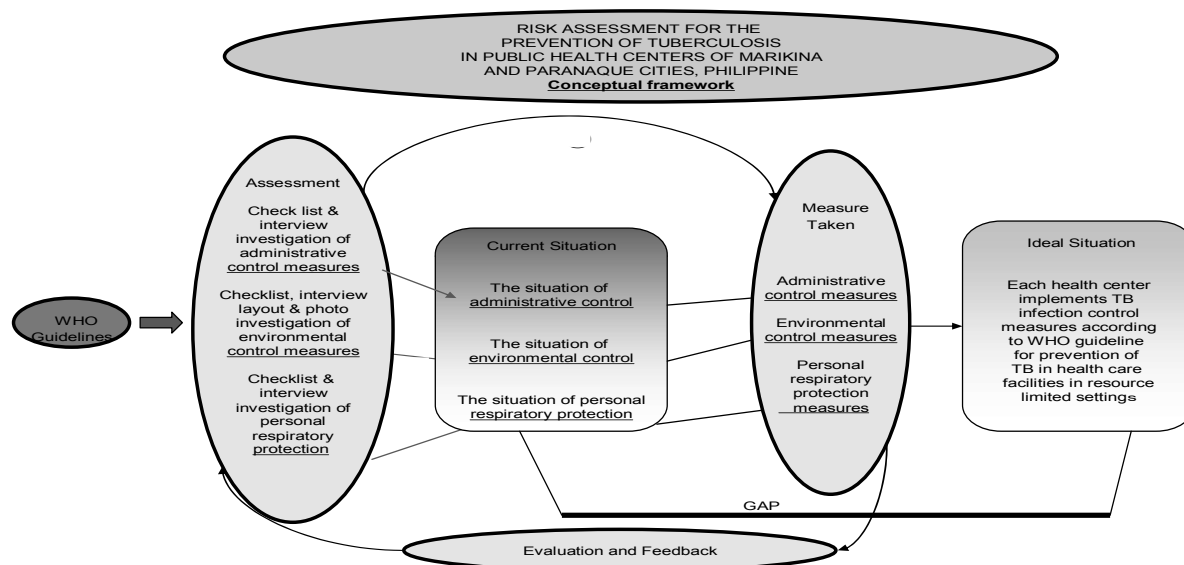


Figure1. Conceptual framework

Early identification and diagnosis by one element, 5) Patient education, 6) Sputum collection by two elements, and 7) Triage and evaluation of suspect TB patients by four elements. The other measures were; 8) Reducing exposure in the laboratory (which was not included in analysis of this study, because of limited number of laboratories; that is one in Marikina and only nine in Paranaque); and 9) Evaluating infection control intervention by five elements. The two environmental control measures assessed were: 1) Ventilation and 2) Hygiene and Sanitation. The personal respiratory protection measure has one component, which is the use of N95 masks. This measure was also excluded from the analysis of this study because in practice very few number of HCs in the Philippines use it due to high cost involved in its purchase.

### 3. Data management and analysis

The raw data from the checklists were coded and entered into a database. The data was analyzed descriptively using Microsoft Excel.

## III. Results

### 1. Overall assessment of administrative and environmental control measures

This assessment was based on the availability of ten TB infection control measures in the HCs (eight administrative and two environmental measures). Table 1 below shows the number of HCs which did not implement certain TB infection control measures as specified. Out of the ten control measures three were implemented by all of the 32 HCs. Out of the remaining seven measures, five control measures, which are: IC plan (28.1%), sputum collection

Table 1. Number of HCs not implementing related TB infection control measures

TB infection control measures	Number of HCs not implementing each measure					
	Marikina (17)		Paranaque (15)		Total (32)	
	n	%	n	%	N	%
Assessment of at-risk settings for TB infection	0	0	0	0	0	0
IC plan	8	47.1	1	6.7	9	28.1
HCW training	1	5.9	0	0	1	3.1
Early identification and diagnosis	0	0	1	6.7	1	3.1
Patient education	0	0	0	0	0	0
Sputum collection	4	23.5	2	13.3	6	18.8
Triage and evaluation of suspect TB patients in health settings	0	0	0	0	0	0
Evaluating infection control interventions	3	17.6	2	13.3	5	15.6
Ventilation	3	17.6	3	20.0	6	18.8
Hygiene and sanitation	5	29.4	0	0	5	15.6

(18.8%), evaluating infection control interventions (15.6%), ventilation (18.8%), and hygiene and sanitation (15.6%) were the least used since they were not implemented by a higher proportion of the HCs. It is considered that the fewer the measures implemented, the higher the risk of TB transmission become.

In assessing the level of risk based on lack of implementation of the above components, Table 2 below shows that 31.3% (10/32) of HCs in Marikina and Paranaque implemented all the ten components for controlling TB infection, and therefore regarded as of the lowest risk for TB transmission. In addition, 50.0% (16/32) implemented nine components, 12.5% (4/32) implemented eight components. However, 3.1% (1/32) implemented six components and another 3.1% (1/32) implemented five components. These two HCs were regarded as being at a relatively higher risk for TB transmission.

## 2. Administrative infection control measures

Based on the major findings, the three least implemented administrative control measures to prevent TB transmission in health center settings were: IC plan, sputum collection, and evaluation of infection control intervention.

**2.1 IC Plan:** The IC Plan comprises of six elements which when properly followed, the infection control programme can be effectively implemented. These elements were: 1)

Identification of risk areas, 2) Assessment of TB infection amongst HCWs, 3) Assessment of TB training needs for HCWs, 4) Recommendations of area-specific IC, 5) Timeline for TB IC, and 6) Budget for IC. HCs in both cities implemented either some or all of IC plan elements as shown in Table 3. Among 32 HCs, 12.5 % (4/32) implemented all six elements while 9.4% (3/32) HCs implemented none of the elements and 18.7% (6/32) implemented only one element (these two account for the 28.1% for IC plan component in Table 1).

**2.2 Sputum collection:** There were two precautionary measures being assessed: sputum collection at proper place, and sputum collection using correct method. Implementation of these two measures in order to avoid TB transmission during sputum collection has to be carried out simultaneously. As shown in Table 4, 6.3 % (2/32) of the HCs reported not to practice both precautionary measures (one from each city), and 12.5% (4/32) practiced only one of the two measures. This in total accounted for 18.8% of the HCs not implementing the precautionary measures as required.

**2.3 Evaluation of infection control interventions:** The study assessed implementation of five elements: 1) Time interval from admission to suspicion of TB, 2) Time interval from suspicion of TB to ordering sputum for Acid Fast Bacilli

**Table 2. Distribution of scores on TB infection control components among 32 HCs**

Distribution of scores	Marikina	Paranaque	Total	%
0 (lowest risk)	3	7	10	31.3
1	9	7	16	50.0
2	3	1	4	12.5
4	1	0	1	3.1
5 (highest risk)	1	0	1	3.1
<b>Total</b>	<b>17</b>	<b>15</b>	<b>32</b>	<b>100</b>

Note: 0: all 10 components implemented; 1: 9 components implemented; 2: 8 components implemented; 4: 6 components implemented and 5: 5 components implemented

**Table 3. Fulfillment of numbers of IC plan elements implemented by HCs in both cities**

Fulfillment of IC plan elements	Marikina	Paranaque	Total	%
0/6	3	0	3	9.4
1/6	5	1	6	18.7
2/6	2	2	4	12.5
3/6	3	5	8	25.0
4/6	0	4	4	12.5
5/6	1	2	3	9.4
6/6	3	1	4	12.5
<b>Total</b>	<b>17</b>	<b>15</b>	<b>32</b>	<b>100</b>

smears, 3) Time interval from ordering to the collection of sputum, 4) Time interval from the examination of the smear to the reporting of results, and 5) Time interval from the return of laboratory results to the initiation of treatment. As shown in Table 5 below, 68.8% (22/32) of the HCs conducted evaluation of infection control interventions for all five elements. However, 15.6% (5/32) of the HCs did not have any of the five elements in place for evaluating TB infection control interventions; three of these were from Marikina and two from Paranaque. Moreover, this component is one of five which were not implemented by a larger proportion of HCs.

### 3. Environmental control measures

Environmental control measures encompass two main elements namely: 1) Ventilation and 2) Hygiene and sanitation.

**3.1 Ventilation:** Four elements for ventilation were assessed. These were: 1) Natural ventilation, 2) Exhaust fan, 3)

Enclosed space with windows always closed, and 4) Enclosed space with no windows at all (1&2 were regarded as good, 3&4 were regarded as inadequate). As shown in Table 6 below, 18.8% (6/32) of the HCs (three from each city) had inadequate ventilation in consultation rooms. In addition, 6.3% (2/32) of the HCs had inadequate ventilation in waiting areas. Ventilation was one of the measures which was not implemented by a higher proportion of HCs.

**3.2 Hygiene and sanitation:** Out of 32 HCs in the two cities, 30 implemented regular disinfection using disinfectants. From Table 7, 10% (3/30) of the HCs carried out disinfection less than once a week and this was attributed to irregular or interrupted supplies of disinfectants.

## IV. Discussion

### 1. Overall assessment of administrative and environmental control measures

The aim of this study was to assess the risk of TB transmission in HC settings of Marikina and Paranaque, by

**Table 4. Fulfillment of numbers of precautions taken during sputum collection**

Fulfillment of precautionary measures	Marikina	Paranaque	Total	%
0/2	1	1	2	6.3
1/2	3	1	4	12.5
2/2	13	13	26	81.2
<b>Total</b>	<b>17</b>	<b>15</b>	<b>32</b>	<b>100</b>

**Table 5. Fulfillment of measures used in evaluating TB infection control interventions**

Fulfillment of elements	Marikina	Paranaque	Total	%
0/5	3	2	5	15.6
3/5	1	2	3	9.4
4/5	1	1	2	6.2
5/5	12	10	22	68.8
<b>Total</b>	<b>17</b>	<b>15</b>	<b>32</b>	<b>100</b>

**Table 6. Ventilation situation of three areas in 32 HCs**

Ventilation situation	Marikina (17)	Paranaque (15)	Total (32)	%
Sputum collection area				
good	17	15	32	100
inadequate	0	0	0	0
Consultation room				
good	14	12	26	81.2
inadequate	3	3	6	18.8
Waiting area				
good	15	15	30	93.7
inadequate	2	0	2	6.3

Note: good: natural ventilation, or exhaust fan, inadequate: enclosed space with windows always closed, or enclosed space with no windows at all

**Table 7. Distribution of frequency of disinfection performed in HCs**

Frequency	Marikina	Paranaque	Total	%
≥ once per day	7	11	18	60.0
Once a week	5	4	9	30.0
< once a week	3	0	3	10.0
<b>Total</b>	<b>15</b>	<b>15</b>	<b>30</b>	<b>100</b>

Note: Two HCs from Marikina used methods which did not meet our criteria for disinfection so were excluded.

looking at the TB infection control measures. This was done using a checklist based on the WHO Guidelines. Three of the components, namely assessments of at risk setting for TB infection, patients' education and triage and evaluation of suspect TB patients; were implemented by all the HCs. This could be due to various reasons such as routine HC practice, general IC practice, or otherwise being regulated by National TB Programme (NTP) Guidelines. For the remaining seven components, two of them, HCWs training and Early identification and diagnosis of TB patients closely followed behind the three above by having a lower proportion of HCs not implementing them (Table 1).

The other five components were not implemented by a higher proportion of HCs; hence, our report focuses on them.

## 2. Administrative control measures

**2.1 IC Plan:** Having a comprehensive IC plan and overseeing its proper implementation is important for TB IC. Among the ten components assessed in the study, 28.1% (9/32) of the HCs did not implement an IC plan as required. This represents a relatively higher proportion of HCs from the two cities. This could be attributable to the fact that there was no specific TB Infection Control policy; hence, not regulated through the NTP Guidelines. This component needs major considerations by City Health Offices and the Department of Health for routine and effective implementation, especially through integration into the NTP Guidelines.

**2.2 Sputum collection:** Sputum collection should always be done outside and away from HCWs and other people. The HCWs should stand behind the patient and away from the direction of wind. This is important in preventing transmission to the HCWs who must supervise the patients during collection so as to obtain a specimen of good quality. It is only when both of the above precautions are done simultaneously; TB transmission would be more effectively prevented. From the study, 18.8% (6/32) of the

HCs fulfilled one or none of the two precautionary measures. It is important that emphasis is put on proper implementation of these measures because they are safe, simple and practical to apply.

**2.3 Evaluation of infection control interventions:** It is important to evaluate the implementation of the IC interventions, to prevent transmission of TB within HC settings. In order to achieve this, records such as time interval from suspicion of TB to ordering sputum, time interval from the examination of smear to the reporting of the results and time interval from the return of laboratory results to the initiation of treatment; need to be reviewed regularly. These records are important to ensure timely diagnosis and treatment of TB patients and avoid delays. The longer the delay in diagnosis and treatment, the higher the risk of TB transmission within the HC settings. From the study, 15.6% (5/32) of the HCs did not keep any of the records for evaluating IC interventions, which indicate the need for these to be initiated and maintained as a routine part of TB Infection Control in the HCs.

## 3. Environmental control measures

The environmental control measures include two aspects, one is ventilation and the other is hygiene and sanitation.

**3.1 Ventilation:** Having natural or mechanical ventilation contribute to prevention of TB transmission by minimizing the concentration of TB infectious droplets in the air.

From the study, ventilation in some of the consultation rooms and waiting areas were not in good condition. Almost all HCs provided the air conditioners for the consultation rooms, so the windows could not be opened. If there were no exhaust fan in place, then it would be very difficult to increase the ventilation of these rooms; therefore, it is recommended that exhaust fans be installed in rooms with air conditioners, and where windows cannot be opened.

**3.2 Hygiene and sanitation:** Even though most of the HCs showed good practice in terms of frequency of cleaning being done, three of the HCs did disinfection less than once

a week, which was regarded as poor practice. This could be a result of irregular and interrupted supplies of disinfectant. Therefore, a systematic support in terms of logistics and on-site supervision and monitoring are important to improve on these situations.

#### 4. Limitations

Listed here are the main limitations of this study as follows:

1. We determined criteria of assessing risk in health centers because of no standard criteria in HC settings; and
2. Checklist was to find out the control measures available in HCs, but not how well, effective, or frequent that these measures were being practiced.

### V. Conclusion

On the basis of the results of this assessment it is concluded that most of the HCs adopt the WHO Guidelines on TB infection control measures to some extent but generally need further improvement in specific areas. In terms of administrative control measures, most of the HCs complied with five out of the eight components. These are: a) relevant records of assessment of at-risk settings for TB infection, b) patient education, c) triage and evaluation of TB suspects, d) training contents and e) policies of early detection and diagnosis. The three components with which HCs showed major inadequacies were: a) Infection Control plan, b) sputum collection precautions and c) routine evaluation of infection control interventions. For environmental control measures, some HCs did not comply with both components which are: a) ventilation and b) hygiene and sanitation.

### VI. Recommendations

1. In the HCs where existing control measures are considered adequate, it is important that efforts are

taken to ensure sustainability.

2. As most HCs lack an IC plan, the incorporation of such an IC plan into local NTP guidelines will possibly help to ensure standardized implementation.
3. In the city level, it is suggested that NTP supervision and monitoring to specifically include infection control component so that relevant weaknesses such as issues on practice can be effectively addressed. Moreover, there is a need to strengthen advocacy specifically at the local government level to address constraints associated with logistics.
4. At the HC level, areas for further improvements include, a) strengthening of supervision and monitoring especially where sputum collection is concerned, b) in-house environmental control measures particularly of ventilation and disinfection and c) implementing routine evaluation of infection control interventions.

### VII. Acknowledgements

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