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Original Article

Assessment of the protective measures taken in preventing nosocomial transmission of pulmonary tuberculosis among health-care workers.

Salman Javed*, Mustafa Zaboli, Alveena Zehra, Naima Shah

Department of Medicine Dow University of Health Sciences, Karachi, Pakistan

Abstract. To assess the protective measures taken at a public sector hospital in preventing nosocomial transmission of pulmonary tuberculosis (TB) among health-care workers, a study was conducted in Civil Hospital Karachi during the period of January 2011 to June 2011. The sample comprised of doctors, registered nurses and non-medical staff working in medical units. Participants were asked about the routine precautionary measures taken against TB as well as those they taken while attending patients suspected of having TB as well as diagnosed TB patients. They were also questioned about the administrative and personal protective measures which were employed against TB. Collected data was entered and analyzed by SPSS software, version 17.0. Chi-square test was applied to test association between categorical variables and Student's t-test for continuous variables.
Total of 150 participants were included in the study. 26.7% of the participants had undergone screening test for TB at the time of their employment while only 16% undergo regular screening test. None of those interviewed ever took any precautionary medication against TB. 46.7% of the participants ensured proper ventilation at their working place. 72.7% stated that the management didn't take appropriate steps to ensure their safety. 6% of the participants had suffered from TB during their service while 13.3% had suffered some other respiratory disease. Participants were more cautious when attending diagnosed TB patients as compared to those who were suspected of having TB. Measures taken to prevent the nosocomial transmission of TB in health-care workers are suboptimal. Factors contributing to the transmission should be explored and subsequently addressed.

Key words: Health-care workers, nosocomial transmission, protective measures, pulmonary tuberculosis

1. Introduction

Pakistan is one of the 22 countries where 80 per cent of new cases of tuberculosis (TB) cases are reported (1). The prevalence of tuberculosis among patients visiting a general healthcare facility is considerably higher than that in the general population. Therefore, there is a higher probability of nosocomial transmission of tuberculosis than the transmission occurring in the general population, and this risk is particularly greater when larger numbers of TBpatients are managed, not only to other patients but also to health-care workers (HCWs) as has been recognized for many years (2,3). Severa l studies have shown higher frequency of tuberculin positivity, tuberculin conversion, and cases of tuberculosis among HCWs managing these patients (4) and a substantial proportion of TB disease in the HCWs is the result of nosocomial TB transmission (5). Despite documented evidences, even low-cost infection-control strategies to protect HCWs from TB are seldom designed in health-care facilities (6).

There are a number of factors contributing to higher incidence of transmission of TB to HCWs, including their close proximity with patients, overcrowded hospital wards, lack of personal protection equipment (e.g., respirators, masks), poorly ventilated wards and poor infection control measures and deficiencies in knowledge and awareness among health workers (7). These issues have been highlighted not just in Pakistan, but many other countries undergoing similar problem (8) yet appropriate steps are yet not taken. We conducted a study to identify the precautionary measures taken by HCWs while attending TB patients.

*Correspondence: Dr. Salman Javed
Dow University of Health Sciences
A 420, Unique classic, Block 15, Gulistan-e-Johar Karachi, Pakistan
Phone: (92-21) 34625792
E-mail: salman_jr4u@hotmail.com.
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Table 1. Socio-demographic factors of the participants

Variables	Mean± S.D	
Age	32.35±7.74	
	(n)	(%)
Gender		
Male	71	47.3
Female	79	52.7
Marital Status		
Married	94	62.7
Unmarried	56	37.3
Category		
Doctors	54	36.0
Nurses	62	41.3
Non-medical staff	34	22.7
Years of working		
<5 years	53	35.3
5years	87	58.0
>5years	10	6.7
Contact with tuberculosis patients		
Regular	70	46.7
Sometimes	80	53.3

2. Materials and methods

A cross-sectional study was conducted in Civil Hospital Karachi. A structured pre-tested questionnaire containing both open and close-ended questions was administered during the period of January 2011 to June 2011. The sample comprised of doctors, registered nurses and non-medical staff working in medical units. Conveniently sampling was used. The questionnaire was designed to assess the routine precautionary measures taking against TB as well as those they take while attending patients suspected of having TB, prior to their laboratory and imaging findings, as well as diagnosed TB patients. The questions included about usage of personal protection equipments, hand washing, maintaining distance with the patient, avoid touching the patient and their articles and ensuring that the patient covers his mouth while sneezing and coughing. The participants were also questioned about the administrative and personal protective measures which were employed against TB.

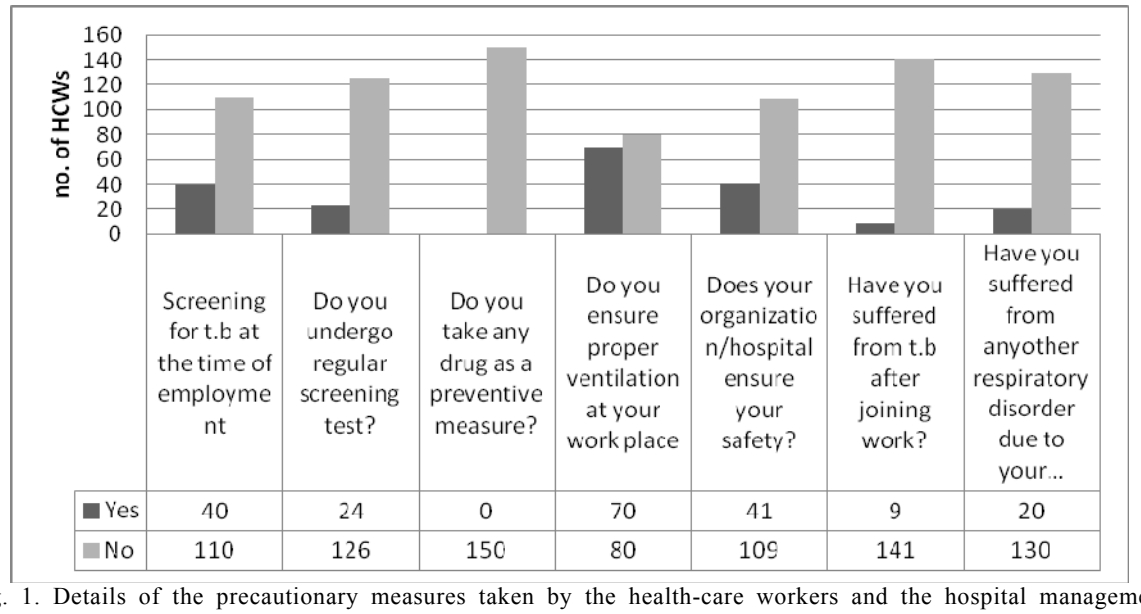

Fig. 1. Details of the precautionary measures taken by the health-care workers and the hospital management HCWs: health-care workers

The collected data was entered in Statistical Package for Social Sciences version 17.0 Software (SPSS Inc., Chicago, Illinois) for statistical analysis. Continuous variables were expressed as mean ± SD and categorical variables were presented as frequencies and percentages. Chi-square test was used to evaluate the relation between categorical variables and Student's t-test for continuous variables. All significance tests were two tailed, and the results were considered statistically significant when the p value ≤ 0.05.

3. Results

A total of 150 participants were included in the study out of which 71 were male and 79 females. The sample comprised of 54 doctors, 62 nurses and 32 non-medical staff personal. 46.7% of the participants were in regular contact with TB patients. Table 1 illustrates the socio-demographic factors of the participants.

Only 26.7% participants had undergone screening test for TB at the time of their employment while only 16% undergo regular screening test. None of those interviewed ever took any precautionary medication against TB (Figure 1). 46.7% of the participants ensured proper ventilation at their working place. There was a great degree of dissatisfaction with the facilities provided by the hospital management as 72.7% commented that the management didn't take appropriate steps to ensure their safety. 6% of the participants had suffered from TB during their service while 13.3% had suffered some other respiratory disease.

When the various precautionary measure taken by the HCWs were assessed which they take while attending patients suspected of having TB and those diagnosed with TB, there was a significant association, as shown in table 2.

Table 2. Precautionary measures taken by the health-care workers while attending suspected and diagnosed patients of TB

	Suspected T.B patients	Diagnosed T.B patients	p-Value
Use of personal protection equipments			
Yes	38	84	0.00
No	112	66	
Wash hands before and after attending			
Yes	58	63	0.00
No	92	87	
Maintain distance with the patient			
Yes	69	96	0.00
No	81	54	
Avoid touching the patient and their articles			
Yes	14	42	0.00
No	136	108	
Ensure patient covers his mouth while Sneezing and coughing			
Yes	41	73	0.00
No	109	77	

T.B: Tuberculosis

4. Discussion

In developing countries the risk of nosocomial transmission of TB is considerably high, not only due to high incidences of tuberculosis and limited resources (9), but also because the focus of their attention is mainly on case detection and treatment using the DOTS strategy (10), rather than preventing the transmission. Personal protection, administrative measures and environmental controls all play a significant part in reducing the transmission of TB to HCWs. However, our study showed inadequate implementation of preventive measures against TB. The results were similar to study conducted by Suzuki and Stone (11).

Our study showed that 73.3% of the participants had no screening examination at the time of their employment while only 16% undergo regular screening test. This pointed a particular negligence on the part of the administration and this not only endangers the patients but also other HCWs who may acquire the infection. None of the participants used any prophylactic medication against TB, despite being aware of the risk of acquiring the disease. 6% of the HCWs interviewed had suffered with TB after employment. Earlier studies commented

that HCWs are less likely to develop TB than the general population in health care centers (12), however, the rate is still on a higher side as compared to other studies (11,13).

Environmental factors including type of ventilation in the health-care centre, patient and HCW crowding, and collective hospital residing of infectious patients were not reported by any study earlier (5) however, we tried to look into these factors. Our findings showed that 46.7% of the HCWs ensure proper ventilation at their work place. Although other low cost measures such as exhaust ventilation, improved natural ventilation, or sunlight could further improve the condition (14), but these measures were not employed by the HCWs neither by the administration. Despite of being aware of the risk of transmission, the use of personal-protection measures was not adequate which is similar to a study from Thailand (15), where only 52% used personal-protection measures. However, the HCWs were more cautious when attending diagnosed TB patients as compared to those who were suspected of having TB.

5. Conclusion

There are clear evidences that the HCWs are heavily exposed to TB, with little or no infection-control measures in place. Nosocomial transmission of TB to HCWs can lead to loss of skilled workers, and this can adversely impact health-care services in the country. Thus, implementation of effective TB infection control can prevent transmission. National TB-control programs and public health agencies in country must begin to address nosocomial TB transmission as an integral part of their TB-control efforts.

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