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Original article

Compliance with Screening and Treatment of Latent Tuberculosis among Health Care Workers in a Lebanese Hospital

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Abstract

Background: Health care workers (HCWs) are at increased risk of Tuberculosis infection. Various Guidelines recommend pre-placement, post-exposure, and annual screening for latent tuberculosis among HCWs. ***Aim:*** to assess the compliance of HCWs with these protocols. In addition, the study aimed to evaluate the compliance with treatment of Latent Tuberculosis and reasons of non-adherence. ***Methods:*** Study was conducted on 560 HCWs in a Lebanese hospital. A Questionnaire collected data on knowledge about latent tuberculosis, post-exposure screening and the reasons behind non adherence to treatment. A retrospective chart review on the same HCWs revealed data regarding TST pre-employment status, compliance to screening, seroconversion and compliance to treatment. ***Results:*** 69% of HCWs did not attend a lecture on Tuberculosis. 76% were aware of screening policies. 88% performed pre-placement testing. 29% were screened post exposure. Only 4.3% had their PPD done annually. 8 HCWs seroconverted; Only 59% of positive employees initiated treatment. . Reasons included refusal or belief of no treatment benefit (55%), not being prescribed a treatment (33%), Contraindications (8%), and being afraid of side effects (4%). 15% of those who received treatment were not able to complete the full course mainly due to side effects (80%). ***Conclusion:*** We reported acceptable rates of pre-placement screening, low rates of annual screening and post exposure screening. We also reported fair rates of initiation and completion of LTBI treatment. We recommend an administrative initiative to strongly implement the policies of screening for LTBI.

Keywords: ***Healthcare Workers, Latent Tuberculosis Infection, Compliance, Screening, Treatment.***

Introduction

Tuberculosis (TB) remains one of the world's deadliest communicable diseases. In 2013, an estimated 9.0 million people developed TB and 1.5 million died from the disease world-wide [1]. The majority of cases occur in developing countries. In Lebanon, the incidence rate of active TB in 2017 was 12/100000 population and the mortality rate was around 0.95/100000 population, making Lebanon a low TB burden country [2].

HCWs are at increased risk of exposure to TB infection as a result of the high level of occupational contact with infected individuals [3]. TB is also more prevalent among health care workers (HCWs) as compared to the general population [4]. Therefore, screening for Latent TB infection is very important in this group.

According to 2019 Center for Disease Control and Prevention (CDC) guidelines, pre- placement screening is recommended for all health care personnel. Serial screening is also routinely recommended for HCWs who reside in a high TB incidence rate country (any country other than Australia, Canada,

US, Western or northern Europe and New Zealand); or HCWs who are immunocompromised [5]. In addition, the world health organization (WHO) recommends that HCWs with baseline negative test results, should receive TB screening annually [6].

Approximately 5%- 10% of HCWs infected and not treated for Latent tuberculosis infection (LTBI) will develop active disease [4]. The risk of progression of LTBI, defined as the presence of mycobacterium TB bacteria without the manifestation of signs or symptoms, to TB disease is highest during the first years after infection [4]. Several studies have shown that HCWs are not compliant with screening and/or preventive measures [7,8,9]. Such data have led to a growing interest in improving the detection and proper management of TB infection among HCWs. To our knowledge, no studies so far have examined the compliance of HCWs with screening and treatment protocols of LTBI in Lebanon.

Therefore, the primary outcome was set to be the evaluation of the compliance of health care workers at a Lebanese University Medical Center with performing pre-placement TB screening, post exposure screening and annual TB screening. The secondary objectives are to evaluate the compliance of HCWs diagnosed with LTBI with the treatment protocols and reasons of non-adherence to treatment.

Methods

The current study was conducted at the Lebanese American University Medical Center - Rizk Hospital (LAUMC-RH), an urban, tertiary care hospital of 100 beds located in Beirut, Lebanon from 2016 to 2017. 560 HCWs (medical, nursing, and allied health professionals) were serving at the hospital in 2016; The study excluded attending physicians, resident physicians, and medical students, because of lack of documented data.

We conducted a cross-sectional study through both a prospective evaluation via closed ended questionnaires and a retrospective chart review using clinical records of HCWs work-ing at LAUMC-RH. HCWs included in the study were healthcare assistants and logistic staff in the following departments: Laundry, admission offices, maintenance, outpatient clinics, physiotherapy department, neurophysiology department, nutrition department, pharmacy, pathology department, sterilization department, and kitchen. The aim of the questionnaire was to collect data on socio demographic characteristics of the participants, scope of practice, du-ration of work, knowledge about latent tuberculosis effects and policies, vaccination status, previous contact with positive Tuberculosis cases, and frequency of post-exposure screening. In addition, we collected data on the reasons behind refusing or discontinuing treatment.

After writing the questionnaire in English, it was translated to Arabic. We then back-translated it to English to ensure the accuracy of the translation. The Arabic and English versions were consistent. A pilot test was conducted on a sample of 20 respondents in both languages. The purpose was to know if there is confusion about any items, test for feasibility, and whether respondents have suggestions for possible improvements of the items. The questionnaire was composed of 26 questions needing a period of no more than 10 minutes to be completed. It was conducted in both English and Arabic, according to the preference of the employee. A single researcher (physician) was dedicated in order to explain the nature of the study and to clarify any inquiry the employee had.

An informed consent was obtained from the employees prior to filling the questionnaire. In parallel, a retrospective chart review of medical records was conducted on the same employees that had completed the questionnaires. The purpose of the chart review was to gather data regarding the purified protein derivative (PPD), pre placement status, compliance to annual two-step testing (TST) screening, change in TST status during employment, and compliance to treatment protocols and duration.

All surveys and chart reviews were completed within 1 year (2018).

Institutional review board (IRB) approval was obtained before beginning this study at the Lebanese American University.

The following definitions were adapted: Pre-placement TST screening test: Two-step testing by administering first TST following proper protocol and documenting the result after 48-72 hours followed by Retesting in 1-3 weeks.

Post-exposure screening: Health care personnel with a previous negative TB test result should be tested immediately and re-tested 8 to 10 weeks after the last known exposure.

Positive skin test: induration of 10 mm or greater following a TST.

TST seroconversion: ≥10 mm increase in the size of the TST induration with a documented negative (<10 mm) baseline two-step TST result [10].

The R statistical program was used for all statistical analysis. The chi-square and Fisher exact tests were used to compare the variables. The chi-square test was used to assess the associated of the gender and age group with the history of TB, pre-placement status and PPD testing. We also checked whether there is a significant relationship between the previous occupation and current work department with the history of TB and pre-placement status respectively. A significant association is considered if the p-value is <0.05 after applying a Bonferroi correction for multiple testing.

Results

Table 1 summarizes the socio demographic characteristics of the Healthcare workers included in the study. In total, 560 healthcare workers were included; 36% were males (202) and 64 % were females (358). None of the approached healthcare workers refused to participate. 38% (215) of these workers were previously employed in a healthcare setting before joining the current institution. Of these, 27% (151) were in the nursing field. 69% (384) of the workers were currently involved in direct patient care. Employees having direct contact with patients were working in the following units: Regular floors, ICU, ER, dialysis, endoscopy, operation room, private clinic, dermatology, ophthalmology, radiology, laboratory, physiotherapy, neurophysiology, and nutrition. The remaining staff, 31% (176), had minimal contact with patients, such as those working in the Administration, pharmacy, pathology, sterilization department, and kitchen. 42% (233) of healthcare workers have been working for more than 15 years at LAUMCRH.

When asked about their awareness about Tuberculosis disease, most of the healthcare workers 69% (386) reported that they did not attend a lecture, seminar or workshop on Tuberculosis. In addition, when asked about their awareness regarding policies of TB screening in a healthcare setting, only 49% (274) said that they were aware of such policies. The major-ity of the HCWs 76%

(426) reported that they were aware of all types of policies including screening, precautions, and treatment.

Most of them were not BCG vaccinated 65% (365); while only 13% (75) received the vaccination. The remaining ones 21.42% (120) said that they do not recall their immunization status. 26% (143) reported a history of contact with a confirmed TB case. The majority of them were previously working in a healthcare setting (p value 3.82-08) (Table 2). Of those who re-ported exposure to TB, only 29% (42/143) were screened post exposure. Most of them were between the ages of 30 and 50 (P value 0.04).

In our hospital, pre-placement testing was performed on 88% (493) of healthcare workers, out of which 50 positive cases were detected. There was a significant association between pre-placement testing and age group with the majority being between 30-50 (p value 0.0008) (Table 3).

After employment, only 61% (344) of healthcare workers had PPD tests performed through-out the years of employment, which was also significantly associated with age group, and the majority being between 30 and 50(p value 1.66-09).

We found that only 4.2% (24) of the HCWs had their PPD done annually (Table 4). A total of 8 HCWs seroconverted; out of which 3 seroconverted within 5 years of employment, one within 9 years, and the remaining within more than 15 years of employment. Table 5 specifies the departments in which the seroconverted HCWs work.

Only 34 out of the 58 (50 at pre-placement and 8 seroconverted) PPD positive patients received treatment. 94% (32) of those treated received Isoniazid regimen for 6-9 months; 6% (2) received a combination of both Isoniazid and Rifampin.41% (24) did not receive any treatment. The most common reasons were their belief of no treatment benefits/refusal of treatment 55% (13), not given a prescription 33% (8), contraindications 8% (2), and afraid of side effects 4% (1). Of those who received treatment, 15% (5) were not able to complete the course mainly due to side effects (4/5) or pregnancy (1/5).

Table 1: Socio demographic Profile

		Frequency (%)
Gender	Male Female	202(36) 358(64)
Age (years)	Less or equal to 30 30-50 More than 50	129(23) 335(60) 96(17)
Education	High School Degree College Degree Post Graduate Degree No degree awarded	217(39) 263(47) 63(11) 17(3)
Previous Occupation before getting hired at current institution.	HCWs in nursing Field HCWs in non-Nursing Field Non-healthcare Occupation	151(27) 64(11) 345(62)
Current Occupation at LAUMCRH	Direct Contact with patients Minimal/no contact with patients	384(69) 176(31)
Duration of Work at LAUMCRH (years)	0.5-4 4.5-15 More than 15	187(33) 140(25) 233(42)

Table 2: History of TB contact as a function of Gender, Age Group (years) and Previous Occupation

History of TB Contact	Yes (%)	No (%)	Adjusted P value
Gender			
Male	56(39)	146(35)	
Female	87(61)	271(65)	
Total	143	417	0.43
Age			
Less or equal to 30	41(29)	88(21)	
30-50	82(57)	253(61)	
More than 50	20(14)	76(18)	
Total	**143**	**417**	**0.14**
Previous healthcare Occupation			
Yes	83(58)	132(32)	
No	60(42)	285(68)	
Total	**143**	**417**	**3.82^{-08}**

Table 3: Pre-placement status by Gender, Age Group (years), and Current Work de-partment

Pre-placement status	Positive (%)	Negative (%)	Not performed (%)	Adjusted P value
Gender				
Male	22(44)	162(37)	18(27)	
Female	28(56)	281(63)	49(73)	
Total	**50**	**443**	**67**	**0.14**
Age				

Less or equal to 30	10(20)	113(26)	6(9)	
30-50	28(56)	267(60)	40(60)	
More than 50	12(24)	63(14)	21(31)	
Total	**50**	**443**	**67**	**0.0008**
Current Work department				
Direct contact with patients	36(72)	304(69)	44(66)	
Minimal or no contact with patients	14(28)	139(31)	23(34)	
Total	**50**	**443**	**67**	**0.77**

Table 4: Frequency of PPD testing after employment by Gender and Age Group (years)

Frequency of PPD testing after employment	Annually (%)	Randomly (%)	Adjusted P value
Gender			
Male	13(54)	102(32)	
Female	11(46)	218(68)	
Total	**24**	**320**	**0.04**
Age			
Less or equal to 30	16(67)	33(10)	
30-50	7(29)	219(68)	
More than 50	1(4)	68(22)	
Total	**24**	**320**	**1.66^{-09}**

Table 5: Divisions where HCWs who seroconverted work and duration of employment at the time of seroconversion.

Divisions	Duration of employment (years)
Laboratory/blood bank technician	5
Billing Assistant	15
Registered nurse floor	2
Orderly (Radiology)	3
Registered nurse (wound Care)	28
Practical nurse(ICU)	20
Practical nurse (Oncology)	9
Registered nurse(one Day Unit)	17

Discussion

The frequency of LTBI in our hospital was 10.4% (58), comparable to published findings in the same geographic region. A study conducted in four major tertiary care hospitals in Saudi Arabia that showed an overall prevalence of 11% [11]. Additionally, Balkhi et al showed a low rate of pre-placement TST testing of approximately 40% in a tertiary hospital in Saudi Arabia [12]. We reported an acceptable rate 88% of latent tuberculosis pre-placement testing. This result is superior to that reported by Driver et al. where unknown TST status at pre-placement was approximately 21% among HCWs in New York [13]. Our result is also superior to results reported from similar studies in the Region. 143 HCWs reported exposure to TB during their career. The post exposure screening rate was only 29% (42). This is a very low rate, especially that the CDC guidelines are very assertive that post exposure screening is highly recommended. This emphasizes the need of administrative enforcement of these policies with closer follow up.

In 2004, Salpeter et al have shown that a 1-year screening interval is a cost effective and safe choice at low, moderate, and high Risk for Tuberculosis Exposure [14]. However, only 4.3% in our hospital performed annual TST screening and most of them were younger than 30 years old (p value 1.66-09). We recommend more emphasis on implementation of annual screening by the occupational medicine team at the hospital to prevent future infection burden and treatment costs.

Seroconversion was witnessed in 8 HCWs; half of them seroconverted within the first 10 years of employment, while the other half seroconverted between 10 and 30 years. 63% (353) were working in the nursing field. This rate is comparable to the results found in a study done in Italy where 65.7% of the exposed HCWs were nurses and 77.8% who seroconverted were nurses [15].

LTBI therapy has proven to decrease disease progression to active TB by 60-90% [16]. Despite this proven effectiveness, studies have demonstrated that those with LTBI often de-cline treatment, and many do not complete it [12]. We reported a fair rate of treatment initiation of 58.6% (34). This rate was lower compared to the rate found in a study done in Riyadh, that showed that 93% of the HCWs who tested positive started treatment [12]. However, we reported high rates of completion of the full course of treatment (6-9 months) reaching 85.3% (29). In comparison, Balkhi et al showed that only 17.4% completed the 9-month course in a tertiary hospital in Riyadh [12]. Another study done at 32 U.S. and Canadian medical clinics showed that only 47.6 % completed the full course (6-9 month) treatment [8]. A previous study has shown that several factors have been linked to non-compliance to treatment including lack of follow-up, physician advice to discontinue therapy because of peripheral neuropathy, pregnancy, or inappropriate prescription [12]. Other factors include longer duration of treatment course, long waiting time for appointment, inconvenient office hours, and complicated telephone system [17]. However, in our study, failure to complete the recommended 6-9 months course was mainly due to side effects (4) and new Pregnancy (1). Rennie et al demonstrated that offering a shorter choice of regimen improves completion. Most patients chose the 3-month rifampicin and isoniazid over the 6-month isoniazid treatment [18]. Joseph et al reported that misconceptions such as the belief that TB was hereditary or a blood infection and that transmission could occur through handling writing utensils or office folders, emerged frequently in routine

TST and LTBI treatment non adherent groups [7]. In our findings, 41.4% (24) Latent TB positive HCWs did not initiate any therapy. The most common reasons were their belief of no treatment benefits/refusal of treatment 55% (13), not given a prescription 33% (8), contraindications 8% (2), afraid of side effects 4% (1). Only 49% re-ported that they were aware about policies concerning tuberculosis screening and that only 31% attended a lecture/seminar/ workshop on Tuberculosis screening. We suggest that more awareness should be made in the hospital through annual lectures or workshops regarding policies, benefits from preventing active TB, and the consequences from not adhering to treatment. We consider that this might improve the compliance to screening and treatment.

We acknowledge some limitations in our study. First, we excluded all doctors and medical students due to lack of proper documentation of data in their health records despite them forming a substantial proportion of the health care workers staff. Second, we admit that there might be recall bias from interviewing the HCWs. Third, being a single-center study may limit the generalizability of our findings. Despite these limitations, we believe that documenting these deficiencies may be helpful to improve tuberculosis control measures at our hospital and other hospitals in the region with similar challenges.

Conclusion

In conclusion, we reported acceptable rates of pre-placement screening, low rates of annual screening and post exposure screening for TB among HCWs. In addition, we reported fair rates of initiation and completion of LTBI therapy among positively documented cases at our hospital. We recommend an administrative initiative at the hospital to more strongly implement the policies of screening for LTBI. This can be achieved by closer follow up on annual screening of all HCWs at the hospital, improved documentation of statuses, including physicians, and medical students, enforcing evaluation of all HCWs following exposure to an infectious source, encouraging the initiation of shorter courses of LTBI therapy, and increasing education through regular workshops and seminars targeting HCWs in the institution.

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Conflict of interest

None

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