

Understanding the Epidemiology of Healthcare Workers Infected with Tuberculosis (TB) Disease in Kedah: Multiple Case Studies from 2017 to 2021



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Introduction

Tuberculosis (TB) has been recognized as an occupational disease among healthcare workers (HCWs) (1). The incidence of TB among HCWs also was higher than in the general population (2). There is scarce information on the epidemiology of TB among HCWs in Malaysia, particularly in Kedah state regarding the source and risk of TB infection at workplace. This study aims to summarize the epidemiology of HCWs who were infected with tuberculosis disease in Kedah between 2017-2021.

Materials and Methods

This was a cross-sectional study involving secondary data from the Kedah State Health Department on TB cases among HCWs from 2017 to 2021. Data were extracted from the original national TB investigation report form for each TB case in Kedah. The qualitative approach of a multiple case study design was utilized incorporating content analysis and thematic analysis. Data anonymity was maintained throughout the analysis and the presentation of the results. The findings were tabulated in a frequency table for descriptive analysis. A table of theme and sub-themes were generated as the output from the thematic analysis. Missing data for certain variables that remained missing were excluded in the denominator.

Results and Discussion

A total of 74 cases of TB among HCWs was documented from 2017 to 2021 and the final investigation report was available for only 53 cases. 36 cases out of 61 (59.0%) were classified as probable occupational diseases while 13 cases had missing data on that variable (Table 1). The top-3 occupational categories among HCWs with TB disease were nurses, medical officers and health attendants, which were 28, 11 and 9 cases, respectively. A total of 48/74 cases (64.9%) were pulmonary TB, followed by 22 cases (29.7%) of extrapulmonary TB. There were four themes generated from this study as tabulated in Table 2. It described the risk of infection based on the individual characteristic, risk of infection at the administrative level, risk of infection at the engineering level and risk of infection at personal protective equipment (PPE) practice. Among the risk of infection from the individual characteristics, HCWs who had comorbidities and were at increasing age were at risk of TB infection due to lower immunity status as found in previous studies (2,3). In addition, the usage of PPE among HCWs can prevent direct transmission however, the adherence level was inadequate as reported in the previous study (4).

Table 1: Characteristics of TB disease among HCWs in Kedah; 2017 to 2022 via content analysis

Variables	N (%)
Gender (n=74)	
Male	21 (28.4)
Female	53 (71.6)
Ethnicity (n=74)	
Malay	66 (89.2)
Chinese	4 (5.4)
Indian	4 (5.4)
Occupational categories (n=73)	
Nurse	28 (38.4)
Medical officer	11 (15.1)
Health attendant	9 (12.3)
Administrative assistant	4 (5.5)
Assistant medical officer	4 (5.5)
Medical laboratory technologist	3 (4.1)
Public health assistant	3 (4.1)
House officer	2 (2.7)
Dental staff assistant	2 (2.7)
Pharmacist	1 (1.4)
Dental officer	1 (1.4)
Physiotherapist	1 (1.4)
Occupational therapist	1 (1.4)
General worker	1 (1.4)
Radiographer	1 (1.4)
Driver	1 (1.4)
Type of occupational disease (n=61)	
Probable occupational disease	36 (59.0)
Non-work related	13 (21.3)
Undetermined	12 (19.7)
Place of exposure (n=53)	
Health clinic	9 (17.0)
Medical ward	9 (17.0)
Emergency department	4 (7.5)
Chest ward	2 (3.8)
Medical laboratory	2 (3.8)
Multidiscipline ward	2 (3.8)
Eye clinic	1 (1.9)
Obstetrics & gynaecology	1 (1.9)
Office	1 (1.9)
Paediatric ward	1 (1.9)
Undetermined	21 (39.6)
Types of TB (n= 74)	
Pulmonary TB	48 (64.9)
Extrapulmonary TB	22(29.7)
TB (unsure of the specific diagnosis)	4(5.4)
History of contact with TB patient (n=53)	
Yes	32 (60.4)
Not sure	13 (24.5)
No	8 (15.1)

Table 2: Thematic analysis findings for the risk of TB infection among HCWs in Kedah

Themes	Sub-themes
Risk of infection based on individual characteristics	<ul style="list-style-type: none"> ➤ Close contact with a confirmed TB patient from family ➤ Close contact with a confirmed TB patient from a colleague ➤ Close contact with a confirmed TB patient at the workplace ➤ Close contact with unsure TB status of a patient ➤ History of working in a medical ward ➤ History of working in an emergency department ➤ Being a senior HCW ➤ Untreated latent TB infection ➤ Individuals with low immunity (e.g.: diabetes mellitus, retroviral) ➤ History of previous TB disease ➤ History of exposure in crowd place in a community ➤ Undetermined risk of exposure
Risk of infection at the administrative level	<ul style="list-style-type: none"> ☐ Long duration working in high-risk workplace ☐ Missed preplacement screening ☐ Misinterpret negative findings during TB surveillance/screening ☐ Patients with TB like-symptoms were not properly isolated
Risk of infection at the engineering level	<ul style="list-style-type: none"> ➤ No proper TB isolation room in a medical ward ➤ Inadequate ventilation in patients' examining room
Risk of infection at the level of PPE practice	<ul style="list-style-type: none"> ☐ Not adhering to PPE guidelines all the time

Specific HCWs' history from the investigation

Case 48

A HCW worked in a health clinic for 5 years and was responsible for the TB program in that area. HCWs adhered to the SOP at work and denied any TB contact from family or colleagues. Further investigation found that HCW worked in a closed room with inadequate ventilation. There was no high-efficiency particulate air (HEPA) filter and ultraviolet germicidal irradiation (UVGI) in that room. HCW was diagnosed with sputum smear-negative PTB.

Case 50

A 20 years of experience HCW whose have worked in various department including the emergency and radiology department may expose to a patient with unsure TB status in the emergency and radiology department. Further investigation found that the HCW did not adhere to PPE guidelines all the times. HCW also had uncontrolled diabetes and an active smoker.

Case 30

A young HCW in paediatric wards developed symptoms of cough, loss of appetite and intermittent fever for about a month. HCW just transferred to current workplace and missed the pre-placement screening due to some misinformation. HCW has been working for 5 years and had worked in medical ward. HCWs adhered to SOP at work and denied any contact with confirm TB patient

Conclusion

- HCWs are at risk of being infected and contracting TB disease at the workplace.
- Prompt action of early identification and treatment can prevent complications besides strengthening the control measures and individual self-awareness toward TB disease.

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