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Knowledge of tuberculosis among physicians working at community health stations in Vietnam

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ABSTRACT

Tuberculosis (TB) remains a significant health problem worldwide, including in Vietnam, where around 174,000 newly diagnosed cases and 13,200 patients died in 2018. There are challenges in the diagnostic process, treatment, and follow-up. The physicians with knowledge of TB working at commune health stations play an essential role in this struggle. The primary purpose of this study was to evaluate knowledge of TB and related factors among physicians working at community health stations in the Northern provinces of Vietnam. A cross-sectional survey was implemented on 335 physicians working at community health stations in 5 Northern provinces in Vietnam from September 2019 to October 2020. The result showed that the TB knowledge of physicians was not good. There were some severe knowledge gaps concerning at-risk groups, the main symptoms of TB, sputum tests for both diagnosis and follow-up and management of attack therapy. The TB training participants had better TB knowledge than others (aOR=1.68; 95%CI: 1.047-2.712). This study underlines the importance of clinical experience and TB training to TB knowledge. We suggest that a TB training plan is required for physicians. Our survey results could inform the process of defining the physicians who work at community health stations' role in TB management in the future.

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1. INTRODUCTION

Tuberculosis is one of the infectious diseases with many cases and deaths worldwide. According to the World Health Organization (WHO), about 1.7 billion people were infected with TB in 2019 [1]. Each year, there were about 10 million new TB cases, 1.2 million TB deaths among people living without HIV, and 251,000 deaths among people living with HIV. Tuberculosis is one of the crucial causes of persistent poverty and an obstacle to social development [2].

WHO estimates 174,000 new TB cases and 13,200 TB deaths in Vietnam in 2018. Currently, multidrug-resistant TB is a burning problem. According to the National TB Program (NTP) report in 2019, the rate of multi-drug resistance in the new group of patients is 3.6%, and in the group of re-treated TB patients is 17% [3]. Like many countries worldwide, Vietnam began implementing the NTP in November 1994. The NTP is one of the 10 National Health Target programs. The NTP has faced challenges in providing

free TB care and integrating the TB control program into the private sector [4]. Between 2000 and 2015, TB deaths decreased by 22% worldwide. However, MDR/RR-TB event cases were predicted to total 450,000 in 2021, an increase of 3.1% from 2020 [5]. The resurgence of TB is attributed to widespread poverty, poor management, the HIV/AIDS epidemic, inadequate public health facilities, rapid population expansion, and rapid urbanization. The growth of refractory drug-resistant forms of TB, on the other hand, has been impacted by inadequate or improper treatment and noncompliance with the NTP guidelines. Considering that TB is one of the main causes of disability-adjusted life years (DALYs), recognizing, managing, and funding the illness will have a significant positive impact on both the economy and public health. The WHO emphasizes that "the medical school should provide every graduate with the knowledge, skills, and attitudes essential to the management of tuberculosis in the patient and the community as a whole". Studies from several nations have evaluated medical students and young doctors' TB knowledge, attitudes, and practices. Several of those studies indicate a lack of knowledge about TB among interns and inadequate management of the disease by them, such as, in South Africa [6], Iran [7], an endemic country [8], South Western Nigeria [9], Pakistan [10], Maseru [11], Nepal [12], South Africa [13], Turkey [14]. Other studies also found a relationship between knowledge and TB training [15]–[20].

In Vietnam, community health centers are crucial for tuberculosis prevention. Detecting suspected TB patients, managing TB patients, and implementing TB prevention initiatives are among the duties of community health stations. The contribution of medical staff, particularly physicians, is crucial to effectively carrying out these activities. However, the information on the assessment of doctors' knowledge of TB treatment and prevention in Vietnam is limited and has not been updated. Consequently, the need for research to evaluate this issue becomes even more crucial. This study aimed to investigate knowledge of TB and related factors among physicians working at community health stations. This information is necessary to meet the future requirements for well-educated medical staff with a good knowledge of TB patients.

2. METHOD

A cross-sectional study was conducted on 335 physicians working at community health stations who had participated in family medicine training courses in 5 northern provinces in Vietnam (from September 2019 to October 2020): Ninh Binh, Ha Giang, Dien Bien, Yen Bai, and Hanoi. Participants included both men and women.

Our questionnaire is based on the assessment questionnaire for the assessment and treatment of pulmonary tuberculosis by Nguyen Phuong Hoa *et al*. [21]. These questions were tested for validity by the expert panel and were piloted before the investigation. The questionnaire, of which 9 questions were about general knowledge and diagnosis of TB, 15 consisted of 2 sections: the first included demographic information. The second section included 31 questions related to TB knowledge questions about the treatment of TB, and 7 questions about the prevention of TB. There were 5 levels of TB knowledge included: Level 1: <50% (correct answer less than 16 questions). Level 2: 50%–<60% (correct answer from 16 to 18 questions). Level 3: 60%–<70% (correct answer from 19 to 21 questions). Level 4: 70%–<80% (correct answer from 22 to 24 questions). Level 5: ≥80% (correct answer of 25 questions or more). The assessment of good TB knowledge in physicians is based on a threshold of 70% correct answers.

The software EpiData 3.1 was used for data entry. The statistical package for social sciences (SPSS) version 20 was used to analyze data. Data were presented using frequencies and percentages for qualitative variables; for quantitative variables, means and standard deviations were used. Univariate analysis (Chi-square test and Fisher exact test) and multivariate regression analysis were used to assess the association between participants' knowledge and other variables. Significance was considered at a p-value<0.05.

Ethical approval was received from the Ethics Council of Hanoi Medical University, Vietnam. The IRB number is 2019/PHAD/TUBER-05-01. The participants were explained the purpose and content of the study. Participation in the study was entirely voluntary, and the questionnaires remained anonymous. All information was kept confidential and for research purposes only.

3. RESULTS AND DISCUSSION

3.1. General demographic characteristics of participants

According to Table 1, 170 (51.0%) of participants are female. The mean age score was 40.3±9.2. The mean working time score was 15.3±9.2. The number of participants who had participated in TB training courses in the last two years was 154 (46%). The mean age score of physicians working at commune health stations was 40.3±9.2, and it is higher than the results of research in Maseru in 2015 (30.76±6.84) [6] and other research in Uganda also showed that the average age of health workers was 35.6 years [22]. According to the study, 49% of the physicians were men, which is higher than the research in Bavi, Vietnam (with

43,5% of medical staff were men) [21], and the research in Maseru showed that 40% of medical staff were men [11]. The following provides an explanation. In contrast to the other research, the subjects in our study were doctors employed by the community health stations, which caused variances in the research findings. In this study, 46% of physicians participated in TB training courses, which is higher than the study in Gabon in 2021 (34.4%) [17], and Pakistan in 2013 (31.1%) [23]. According to the results, there are much more doctors working at community health stations in Vietnam who have received TB training than in other nations with comparable TB burdens, which has a considerable positive impact on the country's ability to eradicate tuberculosis.

Table 1. General demographic characteristics of participants (n=335)

Demographic characteristics		Frequency (n)	Percent (%)
Gender	Male	165	49.0
	Female	170	51.0
Age groups	<35	118	35.2
	35-45	92	27.5
	>45	125	37.3
Seniority (year)	<10	110	32.8
	10-20	121	27.8
	>20	104	39.4
TB training	Yes	154	46.0
	No	181	54.0
Mean age score ($\bar{X}$±SD)		40.3±9.2	
Mean working time score ($\bar{X}$±SD)		15.3±9.2	

3.2. Knowledge of TB of participants

Figure 1 shows that 73.8% of participants answered 60% or more of the questions correctly. 37.6% of participants answered correctly more than 70% of the questions, and 13.7% answered correctly more than 80%. However, 9% of participants answered less than 50% of the questions correctly. Figure 2 shows that most participants did not answer the knowledge assessment questions correctly. It appears that 126 (37.6%) participants had good TB knowledge (answered 70% or more of the questions correctly); 209 (62.4%) participants had poor TB knowledge. Moreover, 30 (9.0%) participants answered less than half of the questions correctly.

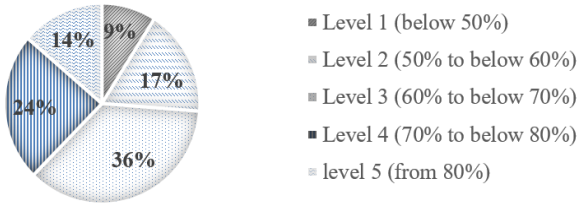

Figure 1. TB Knowledge of participants (n=335)

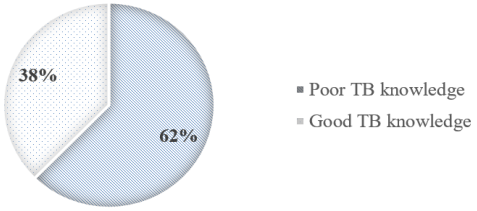

Figure 2. TB Knowledge of participants (n=335)

From Table 2, most of the answers were correct. Moreover, this is a statistically significant difference between the number of correct answers to question “What are the symptoms of TB infection?” from participants who had completed TB training and participants who had not completed TB training (p-value<0.05). In addition, the number of participants who answered correctly to the question “Number of sputum samples needed to diagnose TB" was low (48.1% and 60.2%, respectively).

In Table 3, there is a statistically significant different between the number of correct answers from participants who had completed TB training and from participants who had not completed TB training (p-value<0.05). On the other hand, the number of correct answers about TB treatment management of participants was low. In the number of TB drugs 1, the percentage of not completed TB training participants who had correct answers was 1.7% and 3,9% of with participants who had completed TB training (p-value=0.199). In follow-up sputum test of 6 months regimen, there is a statistically significant difference between not completed TB training participants who had correct answers and participants who had completed TB training. In follow-up sputum test of 8 months regimen, the percentage of not completed TB training participants who had correct answers was 12.2% and 30.5% of participants who had completed TB training. In management of attack therapy, the percentage of not completed TB training participants

who had correct answers was 21% and 26% of participants who had completed TB training. In how to deal with patients who drop out of attack therapy, the percentage of not completed TB training participants who had correct answers was 16.6% and 26%. All association above have statistically significant different (p-value<0.05).

Table 2. Correct answer about general TB of participants (n=335)

No.	Questions of TB knowledge assessment	Completed TB training				p
		Yes (n=154)		No (n=181)		
		n	%	n	%	
1.	TB is an infectious disease	153	99.4	181	100	0.460
2.	TB is caused by bacteria	149	96.8	176	97.2	0.368
3.	TB is transmitted through the respiratory	148	96.1	178	98.3	0.311
4.	Who is at risk for TB	149	96.8	172	95.0	0.082
5.	The rate of people who are infected with TB bacteria becoming TB patients	114	74.0	133	73.5	0.228
6.	What are the risk factors for TB	123	79.9	144	79.6	1.000
7.	What are the symptoms of TB infection	152	98.7	174	96.1	**0.049**
8.	What tests are used to diagnose TB	148	96.1	171	94.5	0.794
9.	Number of sputum samples needed to diagnose TB	74	**48.1**	109	**60.2**	0.073

Table 3. Correct answer about TB treatment management of participants (n=335)

No.	Questions of TB knowledge assessment	TB training				p
		Yes (n=154)		No (n=181)		
		n	%	n	%	
1.	TB can be cured	152	98.7	175	96.7	0.058
2.	Duration of therapy for TB disease	151	98.1	167	92.3	**0.038**
3.	Number of TB drugs 1	6	**3.9**	3	**1.7**	0.199
4.	How to use TB drugs	136	88.3	110	60.8	**0.000**
5.	Time of day to use TB drugs	99	64.3	63	34.8	**0.000**
6.	Follow-up sputum test of 6 months regimen	61	**39.6**	34	**18.8**	**0.000**
7.	Follow-up sputum test of 8 months regimen	47	**30.5**	22	**12.2**	**0.000**
8.	Consequences of non-compliance with treatment	129	83.8	138	76.2	0.149
9.	Criteria for evaluating treatment results	106	68.8	112	61.9	0.420
10.	Management of attack therapy	40	**26.0**	38	21.0	**0.000**
11.	Management of maintenance therapy	56	**36.4**	67	37.0	**0.000**
12.	Periodic re-examination	100	64.9	99	54.7	0.060
13.	Patient's lifestyle	148	**96.1**	121	**66.9**	**0.000**
14.	How to deal with patients who drop out of attack therapy	40	**26.0**	30	**16.6**	**0.017**
15.	How to deal with patients who drop out of maintenance therapy	90	**58.4**	93	**51.4**	0.009

The results in Table 4 showed that the number of correct answers about TB prevention of participants was low in some questions. In “how to prevent TB infection” question, the percentage of not completed TB training participants who had correct answers was 62.4% and 81.2% of participants who had completed TB training. In “how does the patient who is being treated spread the disease to others” question, the percentage of not completed TB training participants who had correct answers was 51.9% and 49.4 of participants who had completed TB training. In “What is the meaning of Mantoux (+)” question, the participants who had completed TB training. All association above have statistically significant different (p-value<0.01).

Table 4. Correct answer about TB prevention of participants (n=335)

No.	Questions of TB knowledge assessment	TB training				p
		Yes (n=154)		No (n=181)		
		n	%	n	%	
1.	When to vaccinate of BCG vaccine (a vaccine for TB)	147	95.5	166	91.7	0.141
2.	How to vaccinate children with HIV	57	37.0	87	48.1	0.120
3.	How to prevent TB infection	125	81.2	113	62.4	**0.000**
4.	What are the objectives of TB prevention activities	111	72.1	146	80.7	0.108
5.	How does the patient who is being treated spread the disease to others	76	49.4	94	51.9	**0.001**
6.	What is the most dangerous source of TB infection	142	92.2	143	79.0	**0.001**
7.	What is the meaning of Mantoux (+)	71	46.1	59	32.6	**0.000**

Similar to previous studies in other countries, which found that the TB knowledge of physicians is not good [7], [8], [24]. The present study found that 37.6% of physicians had good TB knowledge, and

62.4% had poor TB knowledge. General TB knowledge (transmission, cause of disease, ...) was very high (over 97%), it was higher than the research results of Nguyen Phuong Hoa in Ba Vi (90%) [21], research in Nepal (96.2%) [25], research in Pakistan (92%) [26]. Sputum testing, which is the most crucial test to diagnose TB (95.3%), and the knowledge of TB diagnosis, which is detecting suspected signs of TB (97.6%), are both required. This is important for the early discovery and diagnosis of TB since it increases the effectiveness of therapy and stops the disease from spreading to the community. However, only 48.1% of doctors knew how many sputum samples needed to be taken to diagnose TB. This could be because there isn't enough equipment at the commune health station for doctors to perform sputum tests on patients, so they must transfer patients to higher-level medical centers. Low percentage of participants correctly answered questions about TB care and treatment, indicating a lack of knowledge of these topics, such as: Knew the name of first-line TB drugs (1.7%–3.9%); Knew the follow-up sputum test of 6 months regimen (18.8%–39.6%) and follow-up sputum test of 8 months regimen (12.2%–30.5%); Management of attack therapy (21%-26%); How to deal with patients who drop out of attack therapy (16.6%–26%). This situation can be explained by the fact that in the current study, one-third of the participants were young, under 35 years old (35.2%), had no working experience in the field of TB, under 10 years (32.8%), and half of them had not completed TB training courses (46%). These findings are consistent with the findings of other studies [27]–[30]. Addressing these TB knowledge gaps is necessary. Results revealed that participants' knowledge of TB prevention was lacking in various areas, with a low percentage of participants providing accurate answers, such as How to vaccinate children with HIV (37.0%–48.1%); How does the treated patient spread the disease to others (49.4%–51.9%); What is the meaning of Mantoux (+) (32.6%–46.1%). This finding contrasts with that of Essar and colleagues who found that 87.7% of Afghanistan physicians had adequate understanding of TB prevention [31]. TB training courses can solve these limitations.

3.3. TB knowledge of participants and some related factors

According to Table 5, the results of the univariate analysis showed that there are three factors related to the TB knowledge of participants, including age groups (cOR=3.4; 95%CI 2.06 to 5.85); Seniority (cOR=3.2; 95%CI 1.88 to 5.42); TB training (cOR=2.2; 95%CI 1.39 to 3.41). Accordingly, the participants over 35 years old, have more than 10 years of experience, and are trained TB have TB knowledge better than others; these relationships are statistically significant ($p<0.05$). The results of multivariate analysis showed that participants who had TB training in the last two years had TB knowledge better than others (aOR=1.68; 95%CI 1.047 to 2.712). Other factors have not seen statistically significant differences.

Table 5. TB knowledge related to gender, age, working time, and TB training of participants (n=335)

Related factors		Knowledge of TB		Univariate analysis		Multivariate analysis	
		Good n (%)	Poor n (%)	cOR	95% CI	aOR	95%CI
Gender	Male	59 (35.8)	106 (64.2)	1	–	1	–
	Female	67 (39.4)	103 (60.6)	1.16	0.751–1.820	1.09	0.685–1.735
Age groups	<35	24 (20.3)	94 (79.7)	1	–	1	–
	≥35	102 (47.0)	115 (53.0)	3.47	2.062–5.852	2.39	0.839–6.805
Seniority	<10	23 (20.9)	87 (79.1)	1	–	1	–
(year)	≥10	103 (45.8)	122 (54.2)	3.19	1.881–5.421	1.31	0.456–3.795
TB training	No	53 (29.3)	128 (70.7)	1	–	1	–
	Yes	73 (47.4)	81 (52.6)	2.17	1.388–3.414	1.68	1.471–2.712

The analysis showed no statistically significant difference between TB knowledge and the gender of participants (OR=1.16; 95%CI=0.751–1.820). Another study conducted in Nepal in 2020 showed that the knowledge scores of doctors who were female were significantly higher than males (13.9 and 12.8) (p=0.010, cOR=0.9, 95%CI 0.2–1.5) [25]. The results of our study are also different from the study in Karachi - Pakistan, in 2013, when there was a relationship between gender and knowledge about TB of doctors (cOR=1,23, 95%CI=0.650–0.957, p=0.049) [32]. In Table 5, this is a a statistically significant relationship between TB knowledge of participants over 35 and others (OR=3.4; 95%CI 2.06–5.85). The results of the study in Hajj in 2016 showed a difference in knowledge scores among health workers in different age groups (p-value<0.001) [33]. This discrepancy can be attributed to the fact that our study's participants are doctors, but Nepal's study participants are general health workers (physicians, nurses, technicians, public health, and pharmacists); they do many tasks. As a result, they have diverse perspectives about tuberculosis. According to Table 5, this is a statistically significant difference between TB knowledge of participants with more than 10 years experiences and others (OR=3.2; 95%CI 1.88–5.42). Our results are consistent with a study conducted in Norway in 2018, which showed that the knowledge level about TB is

related to seniority (p=0.001) [27]. This can be explained by the fact that doctors with more experience will be more actively involved in treating patients with TB. As a result, they are encouraged to update their knowledge of tuberculosis. There was a positive association between having TB training and the TB knowledge of participants. The results showed that physicians who participated in TB training in the last two years had TB knowledge better than others (aOR=1.68; 95%CI=1.047–2.712). Our research results are similar to the study in Ethiopia when the knowledge of drug resistance is significantly related to training (OR=1.79; 95%CI=1.00–3.17). Other studies have also reported an association between knowledge and better-integrated preventive measures [9], [32].

WHO recommends that medical school "provide every graduate with the knowledge, skills, and attitudes essential to the management of tuberculosis in the patient and the community as a whole" [6]. In this study, a significant portion of the physicians working at community health stations lacked knowledge about TB, particularly on TB diagnosis and TB treatment management. Therefore, this result encourages the NTP design a TB training plan for physicians, especially young physicians who lack of TB treatment experience and physicians working at community health stations.

Our survey was created by knowledgeable and skilled developers; thus, it has a respectable professional standing. Most of the participants completed the questionnaires completely. Multivariate analysis was used to determine the relevant components while controlling for confounders like gender, seniority, and age groups. These benefits offered a strong foundation for our studies and poll, and our findings may generalize to the rest of the nation. However, research on the assessment of TB treatment and prevention knowledge among doctors at community health stations in Vietnam has not been updated. There should be further studies on the practice of diagnosis, treatment management, and prevention of TB among physicians.

4. CONCLUSION

Although broad knowledge was sufficient, there were some serious knowledge gaps regarding at-risk categories, the primary TB symptoms, sputum tests for diagnosis and follow-up, and the management of attack therapy. These deficiencies in understanding could result in the grave mishandling of TB patients, under- and overdiagnosis, and a late MDR-TB diagnosis. This survey emphasizes how crucial clinical knowledge and TB training are to understanding TB. The study demonstrated the need to take education into account and to draw policymakers' and international organizations' attention to plans for enhancing physicians' understanding of and ability to treat tuberculosis.

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