

Assessment of knowledge, attitude and practice towards tuberculosis infection control among health professionals in Nekemte Referral Hospital, Nekemte, Oromia, West Ethiopia: cross sectional facility-based study.

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Abstract

Poor knowledge, poor practice and poor attitude among health care workers may lead to the increased risk of nosocomial tuberculosis transmission. This study was aimed to assess knowledge, attitudes and practice of health professionals towards tuberculosis infection control in Nekemte Referral Hospital, Nekemte, west Ethiopia.

An institutional based cross-sectional study design was conducted in September and October 2019 among 223 health professionals in Nekemte Referral Hospital. Data were collected by using self-administered structured questionnaires which had subdivided components, and analysis was done by double entry of SPSS version 21.

Two hundred study participants responded to our current study with a response rate of 89.6%. In this study, majority of respondents, 54%, were females and 55% of them are first degree holders. From all respondents, 14 (7%), 43 (21.5%), and 60 (30%) had poor knowledge, poor attitudes towards and poor practice towards tuberculosis infection control, respectively.

This study found that significantly high proportion of HCWs had good knowledge, attitude and practice towards tuberculosis infection control.

Keywords: knowledge, attitudes, practice; healthcare workers; tuberculosis; prevention; Ethiopia

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Introduction

Tuberculosis (TB) is an infection caused by the bacillus *Mycobacterium tuberculosis*, which affects lungs, and causes extra pulmonary TB, which affects other body parts. When the patient discharges bacilli to the air through coughing and sneezing, it can be easily spread to other people. In this case, people living in the same household, and having frequent contact with an infectious patient have the greatest risk of contracting TB.¹

According to World Health Organization in 2017, there were an estimated 10.4 million new TB case. Ethiopia is one of the countries affected by disease, ranked seventh in the world and third in Africa.² One study identified that in 2016, new TB cases numbered 219,186, with prevalence of 151,602 cases and 48,910 deaths.³ Another study found that the number of patients following Nekemte Referral Hospital was very high.⁴ In a prison which is located to next Nekemte Referral Hospital, the prevalence of latent TB infection was also 51.2%.⁵

Tuberculosis infection control is a subcomponent of the WHO updated Stop TB Strategy contributing to strengthening of health systems. It is one of the three activities to reduce the burden of TB in persons living with HIV/AIDS.⁶ It is recommended that all health-care settings should have a TB infection-control program.⁷ Healthcare workers, especially those who had frequent contacts with TB patients, are at higher risk of TB infection compared to the general population. The incidence of TB among people working in congregate settings like laboratories, TB clinics and wards exceeds that of the general population.⁸ Tuberculosis is highly transmissible in resource-limited healthcare facilities in which HCWs are at great risk of acquiring TB.⁹ Several studies have confirmed that TB is a significant occupational risk among HCWs in low-and middle income countries,¹⁰ and it is estimated that the incidence of TB among HCWs in high burden countries (>100 cases/100,000 population) is 8.4% greater (95% CI 2.7%-14.0%) than the general population.¹¹

The highest prevalence of TB was found among laboratory staff (43.4%), followed by technician staff

(39.4%), doctors (34.4%) and nurses (32.2%), and the lowest was observed in administrative staff (25.2%) in China.¹² In Ethiopia, better HCW knowledge and positive attitude are more common among those who received training and orientation towards TB infection control. Use of face mask among the HCWs was limited.¹³ In Ethiopia, the safe infection prevention practice significantly increased if HCWs had received training and had infection prevention guidelines available at their work.¹⁴ Another study done in Addis Ababa indicated that one third of HCWs had poor knowledge and half of them had poor practice towards TB infection prevention, and the level of infection prevention was significantly associated with year of experiences, having TB related training.¹⁵

Thus, in this study, an attempt was made to assess the knowledge, attitude and practice of infection control among HCWs in Nekemte Referral Hospital, Ethiopia.

Methods

Study area and period

The study was conducted at Nekemte town from September 2019 to October 2019. This town is found in Oromia region, western Ethiopia; it is 331 km away from Addis Ababa, the capital city of Ethiopia, and currently serves as a capital city of East Wollega zone. This hospital is giving service for about more than 2 million population. This hospital has been serving the population with four big wards and more than ten outpatient departments. It has 18 specialists, 20 general practitioners, 130 nurses, 18 laboratory technicians, 16 pharmacists and more than 250 administrative staff. Currently, more than 3000 TB patients have been following their treatment according to the Administrative office data.

Aim of the study

The main aim of the study was to assess knowledge, attitude and practice toward TB infection control among HCWs of Nekemte Referral Hospital, Nekemte, Oromia, West Ethiopia, 2019.

Study design

An institutional based cross-sectional study design was carried out.

Study population

All health professionals who were currently working in Nekemte referral hospital including doctors, nurses, midwives, pharmacy and laboratory personals were the study population. Some of them are currently working in the TB clinic, Others are also having the chance of getting TB patients at their serving units. For example, the clinicians working in obstetrics and gynecology wards have the chance to be infected from the women admitted for delivery or gynecology cases. In other non-specialized staff, they have the chance to rotate to TB clinic. That was why all health professionals were included.

Sample size determination

The total number of health professionals of this hospital is 223. Because of the small study population, we tried to include all health professionals in this study. Therefore, our study sample was 223.

Data collection tools

A semi structured questionnaires was used which was taken from similar studies¹⁶⁻¹⁸ for data collection; it has specific components of TB infection control questions, using the Program and Clinical Management of Tuberculosis Guideline of the Federal Ministry of Health (FMOH) in Ethiopia,¹⁹ and the World Health Organization policy on TB infection control in health care facilities with specific activities and evidence-based recommendations between 2009-2019.²⁰ The tool comprised of HCWs' demographic and service-related variables (age, sex, education, job category, duration of employment, training/orientation on TB and TB infection control).

Knowledge was assessed using 11 questions by scoring the response 0 (zero) for wrong answers and 1 (one) for correct answers, and summing the scores. After checking the distribution of the responses, the midpoint was used as cut-off points for categorizing knowledge score as good (those who scored above 5.5) or poor (those who scored below 5.5).

There was a total of 12 questions to measure attitude using a scale ranging from strongly agree to strongly disagree. The scores were divided into two as positive attitude for those who scored above six and negative attitude for those who scored less than six.

Practice was assessed using eleven 11 statements with sub sections such as TB guidelines, ventilation of working area, patient education about TB and availability and use of personal protective equipment. Based on the midpoint, classification was made as good practice for those who scored greater than 5.5 or poor practice for those who scored less than 5.5.

Data collection procedure

Data were collected from volunteer health professionals self-report by using self-administered questionnaires after obtaining informed consent from the participants. The data collection tool was prepared in English considering that all health professionals were above certificate level of education. The questionnaires were distributed and collected by data collectors.

Data quality assurance

Quality of data collection process was supervised and monitored by supervisors and principal investigators. We did our research investigation among all health professionals by giving emphasis on ethical consideration. Prior to data collection, adequate training was given for data collectors and supervisors so that appropriate supervision was made. The questionnaire was prepared and customized to avoid entry of illegal values and skip patterns. Each questionnaire was given an identification number and validated by double entry of SPSS Version 21 (IBM, Armonk NY).

Data management and analysis

The collected data were checked for completeness, inconsistencies, and then data were coded, entered and cleaned using SPSS Version 21 by double entry. The results were presented using figures, tables and statements.

Ethical considerations

Permission to carry out this study was given from Institution Review Board (IRB) and Research Committee of the Institute of Health Sciences. Written consent was obtained from the respondents for their willingness to participate in this study.

Table I. Sociodemographic characteristics of the 200 study participants, West Ethiopia, 2019

Characteristic		Number (%)
Age category	20-29	60 (30)
	30-39	84 (42)
	40-49	41 (20.5)
	50-59	15 (7.5)
Sex	Male	92 (46)
	Female	108 (54)
Marital status	Married	144 (72)
	Single	54 (27)
	Divorced or widowed	2 (1)
Profession	Nurse	99 (49.5)
	Physician	35 (17.5)
	Midwifery	31 (15.5)
	Pharmacy personnel	20 (10)
	Laboratory personnel	14 (7)
	Health officer	1 (0.5)
Current working unit	Outpatient department	55 (27.5)
	Gynecology and obstetrics	41 (20.5)
	Medical ward	28 (14)
	Surgical ward	26 (13)
	Pharmacy	19 (9.5)
	Laboratory	14 (7)
	Pediatrics	13 (6.5)
	TB clinic or TB ward	3 (1.5)
	Triage	1 (0.5)
Education	Diploma	53 (26.5)
	First degree	110 (55)
	Second degree and above	37 (18.5)
Service years in health facility	< 3	51 (25.5)
	3-6	67 (33.5)
	> 6	82 (41.5)
Experience in TB clinics	Yes	89 (44.5)
	No	111 (55.5)
If yes, how many years	< 1	41 (46)
	1-4	24 (27)
	> 4	24 (27)
Receipt of TB training	Yes	89 (44.5)
	No	111 (55.5)
If yes, duration of training	< 3 days	9 (10.1)
	4-6 days	26 (29.2)
	7-10 days	33 (37.1)
	> 10 days	21 (23.6)

Results

Socio-demographic characteristics

From 223 health professionals working in Nekemte Referral Hospital, 200 responded to our study, with response rate of 89.6%. Most respondents, 108 (54%), were females. The mean age of the respondents was 39.5 years with a range of 20 years to 59 years. Concerning educational status, more than half of the participants (55%) have first degree. Professionally, nearly half of the respondents (99, 49.5%) were nurses. The majority of the study participants (82, 41%) had greater than six years working experience in the health facility. Eighty-nine (44.50%) had taken in TB related training. The socio demographics characters are depicted in Table I.

Facility and administration related characteristics of healthcare workers towards TB infection control

As it is indicated in the Table II below, sixty percent of the respondents' work places were where windows were cross ventilated and 78% of study participants' work place rooms had TB treatment guidelines. The majority (90.5%) of the respondents open their rooms while they are with TB patients.

Knowledge of health professionals towards TB infection control

The majority (172, 86%) of the respondents knew that "Regular screening of HCWs for TB is one of the TB infection control measures" whereas 110 (55%) knew that surgical masks cannot protect the HCW from

Table II. Facility and administration related questions related to TB infection prevention control, West Ethiopia, 2019.

No.	Facility and administration related questions for TB infection prevention	Response	N (%)
1	Are the windows of your work place cross ventilated?	No	80 (40%)
		Yes	120 (60%)
2	Is there surgical mask available for TB suspected patients?	No	90 (45%)
		Yes	110 (55%)
3	Is there N95 mask available for health care workers?	No	82 (41%)
		Yes	118 (59%)
4	Is there TB treatment guidelines available?	No	44 (22%)
		Yes	156 (78%)
5	Is there TB prevention poster posted?	No	84 (42%)
		Yes	116 (58%)
6	Do you open the window when you are with TB patients?	No	19 (9.5%)
		Yes	181 (90.5%)
7	Is there face mask available for TB patients?	No	84 (42%)
		Yes	116 (58%)
8	Do you wear face mask when you approach TB suspected patients?	No	68 (34%)
		Yes	132 (66%)
9	Do hospitals have appropriate color coded waste bins (disposals)?	No	41 (20.5%)
		Yes	159 (79.5%)
10	Is there separated waiting area for TB suspected patients in your Hospitals?	No	103 (51.5%)
		Yes	97 (48.5%)

inhaling *M. tuberculosis* containing aerosols. From 200 participants, 14 (7%) had poor knowledge scores as indicated in Table III.

Attitude of health professionals towards TB infection control

The majority (157, 78.5%) of HCWs had positive attitudes towards TB infection control. As shown in Table IV, the majority (184, 92%) of HCWs agreed that there is a need for a TB infection control guideline in health facilities. More than 75% (159, 79.5%) agreed that they should wear respirators while caring for TB patients. More than half (116, 58%) were concerned

about being infected with TB and 87 (43.5%) agreed that cough hygiene alone has no role in TB infection control.

Practice of health professionals toward TB infection control

The range of respondents' practice scores ranged from 1–11. As shown in Table V, 169 (84.5%) of HCWs were opening the window whenever TB suspected or a confirmed patient is in the room. Most (161, 80.5%) had always followed TB treatment guidelines to manage new-smear positive cases while 34 (17%) of them used these sometimes, and 5 (2.5%) never followed the guideline.

Table III. Knowledge of HCWs towards TB infection, West Ethiopia, 2019

No.	Knowledge item	Response	N (%)
1.	The door and window of the room should left open	No	73 (36.18%)
		Yes	127 (63.82%)
2	HCW should minimize time for TB patient spend in HF	No	47 (23.5%)
		Yes	153 (76.5%)
3	Surgical mask cannot protect the HCW from TB	No	90 (45%)
		Yes	110 (55%)
4	Respirator N95 can protect HW from TB	No	60 (30%)
		Yes	140 (70%)
5	TB pts should be educated how to cover their mouth with a handkerchief	No	39 (19.5%)
		Yes	161 (80.5%)
6	Every facility should establish an Infection Control Committee	No	28 (14%)
		Yes	172 (86%)
7	TB suspected patients should get priority	No	66 (33%)
		Yes	134 (67%)
8	Regular screening of HW for TB is one of the TB infection control measures	No	28 (14%)
		Yes	172 (86%)
9	Fans and towels can be used to reduce TB transmission in TB ward	No	58 (29%)
		Yes	142 (71%)
10	TB cannot transmitted from person to person by blood contact	No	39 (19.5%)
		Yes	161 (80.5%)
11	Sputum microscopy is the most effective tools for the diagnosis of TB	No	62 (31%)
		Yes	138 (69%)
	Overall knowledge	Good	186 (93%)
		Poor	14 (7%)

HCW: healthcare worker.

Table IV. Attitude of HCWs towards TB infection control, West Ethiopia, 2019

No.	Attitude statements	Response	N (%)
1	There is a need for guidelines regarding TB infection control in a health care facility	Agree	184 (92%)
		Neutral	13 (6.5%)
		Disagree	3 (1.5%)
2	HCWs should wear respirators while caring for TB patients	Agree	159 (79.5%)
		Neutral	31 (15.5%)
		Disagree	10 (5%)
3	Respirators do not protect against drug-resistant TB even if I wear it all time	Agree	91 (45.5%)
		Neutral	29 (14.5%)
		Disagree	80 (40%)
4	Even after a patient with TB leaves the room I am working in, I remain at risk of contracting TB	Agree	136 (68%)
		Neutral	18 (9%)
		Disagree	46 (23%)
5	Most HCWs are already infected so there is no need of infection control measures	Agree	63 (31.5%)
		Neutral	25 (12.5%)
		Disagree	112 (56%)
6	I do not wear respirator because patients do not like me to wear it	Agree	52 (26%)
		Neutral	29 (14.5%)
		Disagree	119 (59.5%)
7	I am concerned about being infected with TB	Agree	116 (58%)
		Neutral	25 (12.5%)
		Disagree	59 (29.5%)
8	There is need to screen HCWs who may be exposed to TB for TB infection or disease	Agree	126 (63%)
		Neutral	43 (21.5%)
		Disagree	31 (15.5%)
9	I may turn off fans if they become noisy or cause cold air	Agree	104 (52%)
		Neutral	52 (26%)
		Disagree	44 (22%)
10	Sputum induction procedures in wards put HCWs at an increased risk of getting infected with TB	Agree	144 (72%)
		Neutral	36 (18%)
		Disagree	20 (10%)
11	Cough hygiene has no role to play in infection control	Agree	87 (43.5%)
		Neutral	38 (19%)
		Disagree	75 (37.5%)
12	HCWs working in HIV care and treatment clinics are at risk of infection with TB	Agree	137 (68.84%)
		Neutral	42 (20.6%)
		Disagree	21 (10.55%)
Overall attitude		Good	157 (78.5%)
		Poor	43 (21.5%)

HCW: healthcare worker.

Table V. Practice of HCW towards TB infection control, West Ethiopia, 2019

No.	Practice Item	Response	N (%)
1	Facilities leaders monitor and evaluate HCWs on TB infection control.	Always	138 (69%)
		Sometimes	52 (26%)
		Never	10 (5%)
2	Follow TB treatment guideline to treat smear positive patients	Always	161 (80.5%)
		Sometimes	34 (17%)
		Never	5 (2.5%)
3	Opening window when TB suspected patient is in the room	Always	169 (84.5%)
		Sometimes	22 (11%)
		Never	9 (4.5%)
4	Using mask when approaching TB suspected patient	Always	124 (62%)
		Sometimes	51 (25.5%)
		Never	25 (12.5%)
5	Giving priority patients coughing in waiting area	Always	94 (47%)
		Sometimes	49 (24.5%)
		Never	57 (28.5%)
6	Educating TB suspected patients how to cough and sneezing.	Always	126 (63%)
		Sometimes	69 (34.5%)
		Never	5 (2.5%)
7	Proper use of fan if available	Always	84 (42%)
		Sometimes	86 (43%)
		Never	30 (15%)
8	HCW screening for TB after contact with TB patients	Always	96 (48%)
		Sometimes	75 (37.5%)
		Never	29 (14.5%)
9	Availability of designated sputum produced area for TB patients	Always	146 (73%)
		Sometimes	25 (12.5%)
		Never	29 (14.5%)
10	Use AFB as diagnostic tools for TB suspected patients	Always	154 (77%)
		Sometimes	20 (10%)
		Never	26 (13%)
11	Check if mask is airtight	Always	95 (47.24%)
		Sometimes	52 (26.13%)
		Never	53 (26.63%)
Overall practice		Good	140 (70%)
		Poor	60 (30%)

HCW: healthcare worker.

Nearly two thirds (126, 63%), of the participants educated TB suspected or confirmed patients on cough etiquette (covering of mouth while coughing, no spitting on the floor, etc.). Approximately two thirds (124, 62%) of participants use a respirator whenever they approach TB patients. Sixty (30%) of them had poor practice toward TBIC.

Discussion

In this study, the majority of the respondents had good knowledge towards TB infection control. This finding is almost similar to the finding of the study conducted in Iraq revealed that (98.4%) of HCWs had a 'good' score for knowledge of TB.²¹ This finding was higher than the study conducted in Addis Ababa where (63.9%) concluded to had overall good knowledge from the total 582 HCWs¹⁵ and a study conducted in Thailand indicated that 56% of healthcare providers were found to possess a 'good' level of knowledge of TB infection control.²² The difference could be due to sample size, the level of health institutions and the knowledge level of study participants.

This study showed that 70% of the respondents have good practice. This is slightly higher than the study conducted in Addis Ababa, Ethiopia (48.6%),¹⁵ and the study conducted in the Berea District of Lesotho, South Africa that revealed that half (52.7%) received a 'good' score for practice in the evaluation of occupational exposure to TB infection control among healthcare workers.¹⁷ The difference could be due to sample size, the level of health institutions, training they received and the practice level of study participants. Practice of the HCWs regarding TB infection control (30%) was not good. This low practice might be due to low proportion of trained and experienced HCWs in respective health facilities.

Our study showed that 84.5% of the respondents knew the door and window should be open whenever a TB suspected or confirmed patient is in the room. This finding was higher than the study conducted in St. Luke's Medical Center, Philippines, where 39% of the respondents had good practice towards TB infection control.²³ The difference could be due to the sampled health facility level and methods.

The majority (80%) knew the importance of educating TB patients to cover their mouths with a handkerchief and 86% knew the need of infection control committee. These findings are consistent with WHO TBs treatment guideline.²⁴

Respiratory protection control is the third level of a TB infection control program and consists of the use of protective equipment in situations of a high risk for exposure to TB disease.⁷ However, this study showed that 45% of participants wrongly believed a surgical mask can protect HCWs from inhaling *M. tuberculosis* containing droplets. This result is nearly consistent with the finding from northwestern part of the country.¹⁸ The present study found that 78.5% of the study participants had positive attitude towards TB infection control, which was consistent with a study conducted in Nepal, in which 73.2% of healthcare providers had positive attitude towards TB infection control.¹³

Conclusion

Generally, the results of this study revealed that high proportion of HCWs had relatively good knowledge towards TBIC. Around 60% of HCWs wrongly believed surgical masks can protect HCWs from inhaling *M. tuberculosis* containing aerosols. Around two thirds of health professionals had relatively good practice towards TB infection control. Low proportions of the participants were trained on TB infection control. More than half of the rooms where HCWs are working had cross ventilated windows.

Training of health professionals with emphasis on practical aspects is vital to strengthen the implementation of TB infection control activities. Giving on the job training for junior staff is important to improve TB infection control practice. Using focus group discussions or in-depth interviews to find out the attitude of HCW towards TB infection control is important.

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Competing interest

The authors declare that no competing of interest

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