Knowledge, attitudes and practice towards multi drug resistant tuberculosis management among health care providers at Kibagabaga Hospital in Kigali

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Abstract
Worldwide, tuberculosis (TB) continues to be a major public health issue, and the discovery and management of Multi Drug Resistant Tuberculosis (MDR-TB) are a complete disaster. The global MDR-TB treatment accomplishment rate was 52% in 2015, with just 125000 (20%) of the anticipated 500,000 recently fit for MDR-TB therapy cases still registered. However, healthcare providers have inadequate knowledge about MDR-TB management. Therefore, this study assessed at healthcare providers' knowledge, attitudes, and practices regarding MDR-TB management. Therefore, it is driven by the following detailed objectives: to evaluate the level of knowledge on MDR-TB management, to identify attitudes on multi-drug resistant tuberculosis management, to determine the level of practices on MDR-TB management, and to establish factors associated with practice toward MDR-TB management among health care providers at Kibagabaga hospital. The findings of the study will be valuable to policymakers in adopting methods to the control and management of MDR-TB, as well as a reference for future research. The study design used was descriptive cross-sectional. Nurses, midwives, physicians, and counselors comprised the target population, and a sample size of 122 was calculated using Taro Yamane's sample size calculation formula. To collect quantitative data on healthcare providers' knowledge, attitudes, and practice about MDR-TB management, a self-questionnaire was utilized. SPSS Version 21 was employed in statistical analysis. Agreeing to the findings of the study, the majority of healthcare providers (63.1%) had a low level of knowledge, nearly half (48.4%) had a positive attitude toward MDR-TB, and 45.9% had strong MDR-TB management practice. The multivariable logistic regression analysis revealed that training on MDR-TB was 4.57 times (AOR = 4.57; 95% CI = 1.79 - 11.69; p value = 0.002) more likely to have sufficient practice managing MDR-TB, and good knowledge about MDR-TB was 4.93 times (AOR = 4.93; 95% CI = 1.97 - 12.35; p value = 0.001) more likely to have adequate MDR-TB management practice. Healthcare providers' knowledge, attitude, and practice regarding MDR-TB management were insufficient. As a result, it is necessary to strengthen MDR-TB management implementation by providing trainings in increasing knowledge among healthcare providers.

Keywords: Attitudes, Health care providers, Knowledge, Multi-drug resistant tuberculosis management, Practice

Introduction

Worldwide, tuberculosis (TB) continues to be a major public health issue. In 2015, an additional 9.6 million tuberculosis cases were predicted per the WHO's 2016 projection. Despite a 22% decrease in death rates from 2000 to 2015, TB continued to rank among the top ten global killers, with an estimated 1.5 million deaths in 2015 (Sabiiti 2017). According to this report, the MDR-TB detection and treatment crisis persists. Only 125000 (20%) of the expected 500.000 recently eligible for MDR-TB treatment were registered in 2015, and 52% of MDR-TB patients worldwide completed their treatments in 2013 (Sabiiti 2017).

Multi Drug Resistant TB is a significant issue across the globe, and it is becoming more common among newly diagnosed TB patients in Sub-Saharan Africa. A total of sixteen (16) epidemiologic studies on MDR-TB were conducted in Kenya, Burundi, Rwanda, Tanzania, and Uganda. For recurrent patients, the prevalence of MDR-TB ranged from 3.9% in Tanzania to 17.7% in Uganda, while for new cases, the prevalence ranged from 0.4% in Tanzania to 4.4% in Uganda (Kidenya et al. 2014; Mtwangambate et al. 2014). In a standard review and meta-analysis in Ethiopian revealed that the prevalence of MDR-TB was found to be 2.64% and 11.54% among recently diagnosed and previously treated TB patients respectively (Reta et al. 2022).

Health care workers lacked appropriate understanding about MDR-TB, and this lack of knowledge was associated to risky behaviors such not using protective masks and disobeying MDR-TB treatment plans. For instance, in a study, healthcare providers at Botsobela Hospital in Maseru, Lesotho were evaluated for their knowledge, attitude, and practice related to the prevention and treatment of MDR-TB. The majority of them exhibited a negative attitude toward MDR-TB patients. An additional analysis of the same study found that knowledge level did not affect attitude but did predispose good practice (Adebanjo and Malangu 2015).

In Rwanda, the screening process for multi-drug-resistant tuberculosis was reinforced among high-risk groups, particularly those who are constantly living with or in contact with TB cases. One hundred seventy-five (175) consumers in Rwanda were found to be Rifampicin resistant during the initial Xpert testing between May 4, 2017 and April 30, 2019 (Ngabonziza et al. 2020). Moreover, the fact that Rwanda has become a WHO center of excellence for MDR-TB training in Africa, with two MDR-TB referral hospitals that care for MDR-TB patients. However, little study has been conducted on healthcare personnel' knowledge, attitude, and practice surrounding MDR-TB. As a result, the purpose of this research is to evaluate healthcare personnel' knowledge, attitudes, and practice related MDR-TB management at a selected district hospital in Rwanda.

Methods and Materials

Study design and setting

The study used a quantitative technique and analytical cross-sectional design. When the goal of the study is to create a detailed description of an issue, a descriptive research design is most appropriate (Asenahabi 2019). It was conducted in Kibagabaga Hospital, one of Rwanda's two MDR-TB referral hospitals, is found in Kibagabaga Cell, Kimironko Sector, Gasabo District, Kigali City.

Sample size and sampling technique

This study's population included 176 health care providers from Kibagabaga District Hospital, including physicians, nurses, midwives, and counselors.

The sample size was determined using Taro Yamane's formula from 1967.

$$n = \frac{N}{1 + N * (e)^2}$$

where the sample size is n.

Population as a whole N;

Marginal error set at 95% confidence interval (CI) = 0.05;

$$n = \frac{176}{1 + 176\,(0.05)^2}$$

n = 122 Health care providers

Healthcare providers were assigned proportionally based on their professional cadre. To determine the sample of health care providers, an equal proportionate stratified random sampling approach was utilized, followed by a convenience sampling method according to the availability to select participants until the researcher reached the sample size across all services during data collection.

Methods of data collection

In his study a self-administered questionnaire was used. It was adopted from the study done on healthcare professionals' knowledge, attitudes, and behaviors towards preventive and multidrug-resistant tuberculosis at Botsabelo hospital Maseru, Lesotho (Adebanjo and Malangu 2015). The questionnaire was edited and adapted for the local context before being used to collect data with permission. The questionnaire was divided into four sections, covering socio-demographic information, questions about MDR-TB knowledge, questions about HCP attitudes toward MDR-TB, and questions about health care providers' MDR-TB practice. The right response to knowledge-related, attitude-related, and practice-related questions was determined by consulting the national TB prevention and management guideline. The researcher administered the questionnaire after testing it on 12 health care providers who did not participate in the research.

Data Analysis

The data entry program utilized was SPSS version 21. The characteristics of the respondents were summarized using descriptive analysis and frequencies and percentages. The level of knowledge, attitude, and practice was determined using a score assessment. The correct response received a score of one, while the erroneous response received a score of zero. After calculating a mean for each indication, individuals with scores above the mean were classified as having high knowledge, attitude, and practice, while those with scores below the mean were classified as having bad. The related practices for managing MDR-TB were identified using a bivariate analysis utilizing the Chi-square test. The independent variables associated to MDR-TB management practices were then evaluated using multivariable logistic regression. The p value and 95% confidence interval were used to determine the level of statistical significance.

Ethical Considerations

This study was carried out in compliance with the ethical norms that govern research involving human participants after gaining approval from the MKUR Institute of Postgraduate Studies and Research. Permission from Kibagabaga Hospital Management was also required to administer questionnaires to staff members. Participation was entirely voluntary, as previously stated; no coercion was used. No participant's name was recorded on the questionnaire to maintain confidentiality. Hard copies were kept in a closed cupboard, while soft data was kept in a safe laptop protected with a password, with data valid for ten years.

Results

Participants' sociodemographic characteristics

As shown in Table 1, females made up 62.3% of the participants, with the age group 31 to 39 accounting for the biggest proportion (44.3%). The majority, (68.8%), were nurses, (48.4%) had 6-10 years of professional experience, and more than half (68.8%) had no MDR management training.

Table 1: Participant socio-demographic characteristics

Variables	Frequency (122)	Percept (%)
Age group		
20-29	8	6.6
30-39	54	44.3

40-49	51	41.8
50-59	9	7.4
Gender		
Male	46	37.7
Female	76	62.3
Profession		
Medical doctor	17	13.9
Nurses	84	68.9
Midwives	16	13.1
social workers	5	4.1
Working experience		
1-5	46	37.7
6-10	59	48.4
11-15	10	8.2
16-20	4	3.3
21-25	3	2.5
Training		
Yes	38	31.1
No	84	68.9

Knowledge on MDR-TB management among Healthcare providers at Kibagabaga Hospital

Table 2 shows that most of the healthcare providers responded corrected to the causes of MDR-TB (68.0). Large percentage responded that MDR-TB is contagious (92.6), spread from person to person (94.3%), patients catch MDR disease inside the hospital122 (100.0). The fewest participants (83 (68.0%) correctly answered the question, "Do surgical masks prevent MDR-TB patients from coughing up MDR-TB particles into the air?" and the definition of multidrug-resistant tuberculosis had the fewest participants (96 [78.7%]). The questions asked if N95 masks protect healthcare providers and visitors from MDR-TB particles, 96 participants (78.7%) responded correctly.

Table 2: Distribution of the participants according to knowledge about MDR-TB Management

Knowledge variable	Correct, n(%)	Incorrect, n(%
Mycobacterium bacillus, which causes multidrug-resistant tuberculosis, is resistant to at least isoniazid and rifampicin.	83(68.0)	39(32.0)
MDR-TB is contagious	113(92.6)	9(7.4)
MDR-TB is often spread from person to person through the air	115(94.3)	7(5.7)
Most MDR-TB patients catch MDR disease inside the hospital	122 (100.0)	0(0.0)
N95 masks protect healthcare providers and visitors from MDR-TB particles	96(78.7)	26(21.3)
By preventing MDR-TB particles, surgical masks safeguard patients and staff in medical facilities.	102(83.6)	20(16.4)
Surgical masks keep MDR-TB patients from coughing MDR-TB particles into the air	78(63.9)	44(36.1)
MDR-TB is caused by Mycobacterium tuberculosis	108(88.5)	14(11.5)
Everyone infected with MDR-TB has symptoms.	107(87.7)	15(12.3)
Sputum smears are used to diagnose MDR-TB.	105(86.1)	17(13.9)
Sputum testing is the correct method for determining MDR-TB therapy outcome.	112(91.8)	10(8.2)

The treatment period for MDR-TB is 9 months.	106(86.9)	16(13.1)
The drug susceptibility test (DST) is used to diagnose MDR-TB.	110(90.2)	12(9.8)

Level of Knowledge of Participants

The level of knowledge was determined using the parameters presented in Table 4.2 using score assessment. The correct response received a score of one, while the erroneous response received a score of zero. To categorize the level of knowledge, the mean score of 11.12 was utilized as the cut-off point. Participants with a score of 11.12 or higher were thought to have good knowledge, while those with a score below the mean were thought to have inadequate knowledge. As shown in Figure 1 majority of the respondent had poor level of knowledge (63.1%).
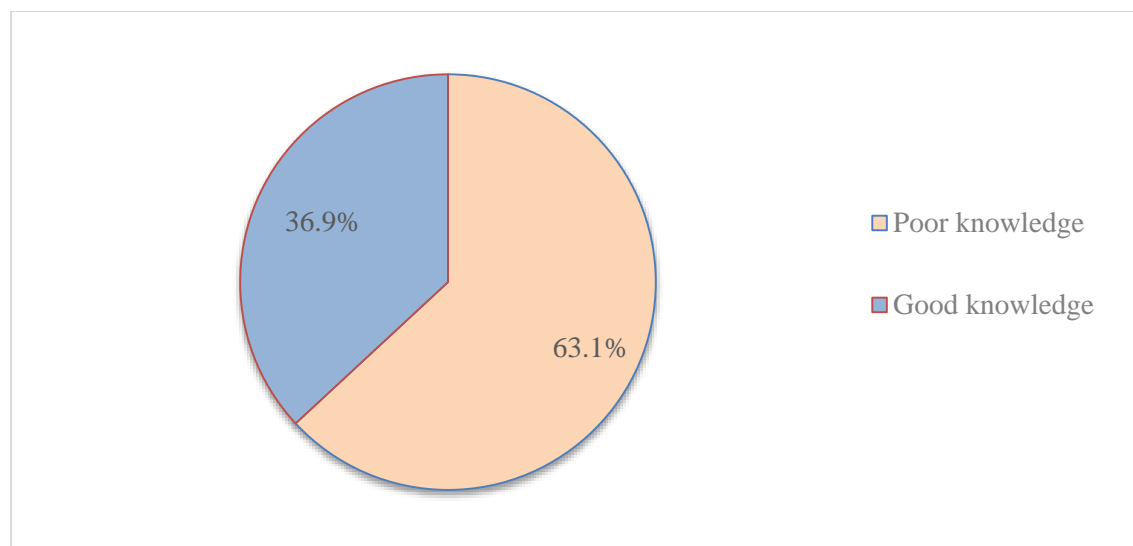

Figure 1: Level of Knowledge

Attitudes towards Multi Drug Resistant Tuberculosis management

This section presents the distribution of the participants' attitudes toward multidrug resistant tuberculosis management (Table 3). The attitude was assessed using seven Likert scale variables: strongly agree (SA), agree (A), not sure (NS), disagree (D), and strongly disagree (SD). Almost everyone agreed that it is essential to stop the spread of MDR-TB inside of hospitals. The majority of HCPs (77.9%) are concerned about contracting MDR-TB from patients. All agreed that it is critical to prevent MDR-TB spread in the hospital and to feel comfortable obtaining MDR-TB diagnosis. Healthcare personnel who do not use N95 masks are more likely to get MDR-TB (82.8), and (47.5) are unsure whether social and cultural variables are treatment barriers.

Table 3: Distribution of the participants according to attitude toward MDR-TB management

Variables	SA, n(%)	A, n(%)	NS, n(%)	D, n(%)	SD, n(%)
Most HCPs are afraid that they may contact MDR-TB from the patients	95(77.9)	27(22.1)	0(0.0)	0(00)	0(00)
It is critical to keep MDR-TB from spreading in the hospital.	122(100)	0(00)	0(00)	0(00)	0(00)
I would feel safe asking for an MDR-TB diagnosis if I started to experience MDR-TB symptoms.	122(100)	0(00)	0(00)	0(00)	0(00)
Treatment barriers are social and cultural variables.	0(00)	15(12.3)	58(47.5)	25(20.5)	24(19.7)
Treatment for MDR-TB becomes worse while using conventional or alternative therapy.	67(54.9)	55(45.1)	0(00)	0(00)	0(00)

Patients with MDR-TB should be permitted to die without therapy.	0(00)	0(00)	0(00)	18(14.8)	104(85.2)
Lack of N95 masks for healthcare providers puts them at higher risk of getting MDR-TB	101(82.8)	21(17.2)	0(00)	0(00)	0(00)

Level of Attitude about MDR-TB Management

Positive and negative attitudes were assigned to the attitude scores. As shown in Figure 4.2, participants with mean scores greater than 32.48 were categorized as having a positive attitude, while those with mean scores less than 32.48 were categorized as having a negative attitude. According to the figure above, the majority of participants (51.6%) had a negative attitude as indicated in Figure 2.
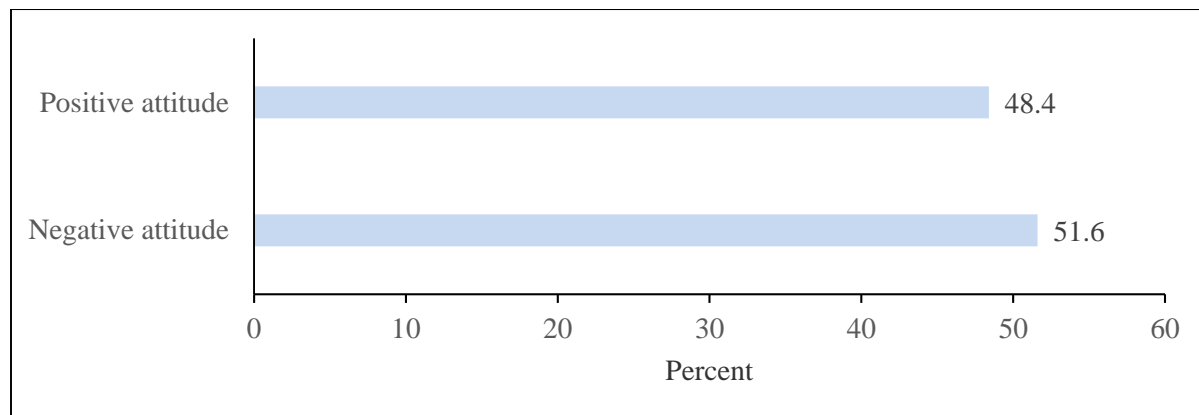

Figure 2: Attitude toward MDR-TB

MDR-TB prevention and control methods and procedures

As indicated in Table 4, most (91.8%) of participants own the MDR-TB guidelines 'copy and highest proportion (43.4%) were always referring to MDR-TB guidelines. Most (62.3%) reported that were not cross ventilation the wards at this hospital. About 56.6% were involved in MDR-TB education for patients or communities. When around MDR-TB patients, a large fraction (79.8%) always wears a N95 mask, whereas 70.5% frequently wear a N95 mask.

Table 4: MDR-TB prevention and control methods and procedures

Variables	Category	Frequency (%)
Possessing a copy of the MDR-TB guidelines	Yes	112(91.8)
	No	10(8.2)
The frequency with which MDR-TB guidelines are referred to	Rarely	42(34.4)
	Frequently	27 (22.1)
	Always	53(43.4)
Cross-ventilating of the rooms in the infection control (opening doors & windows)	Yes	46(37.7)
	No	76 (62.3)
Participated in the education of patients or communities regarding MDR-TB management	Yes	69 (56.6)
	No	53(43.4)
The frequency with which N95 masks are worn when in the presence of MDR-TB patients	Occasionally	23(18.9)
	Sometimes	8(6.6)
	Always	91 (74.6)

Wearing N95 or N100 frequently when among individuals who may have MDR TB	Occasionally	25(20.5)
	Sometimes	86(70.5)
	Always	11(9.0)

Level of practice toward MDR TB management

This section highlights the participant's level of practice with MDR TB management. The parameters used to determine level of practice are presented in Table 4.4. The scores were divided into adequate and inadequate categories. Over the mean score of 8.25, an adequate level of practice was considered, while a score below the mean score was considered inadequate. Figure 3 demonstrated that more than half of the individuals (54.1%) had insufficient MDR-TB management practice.
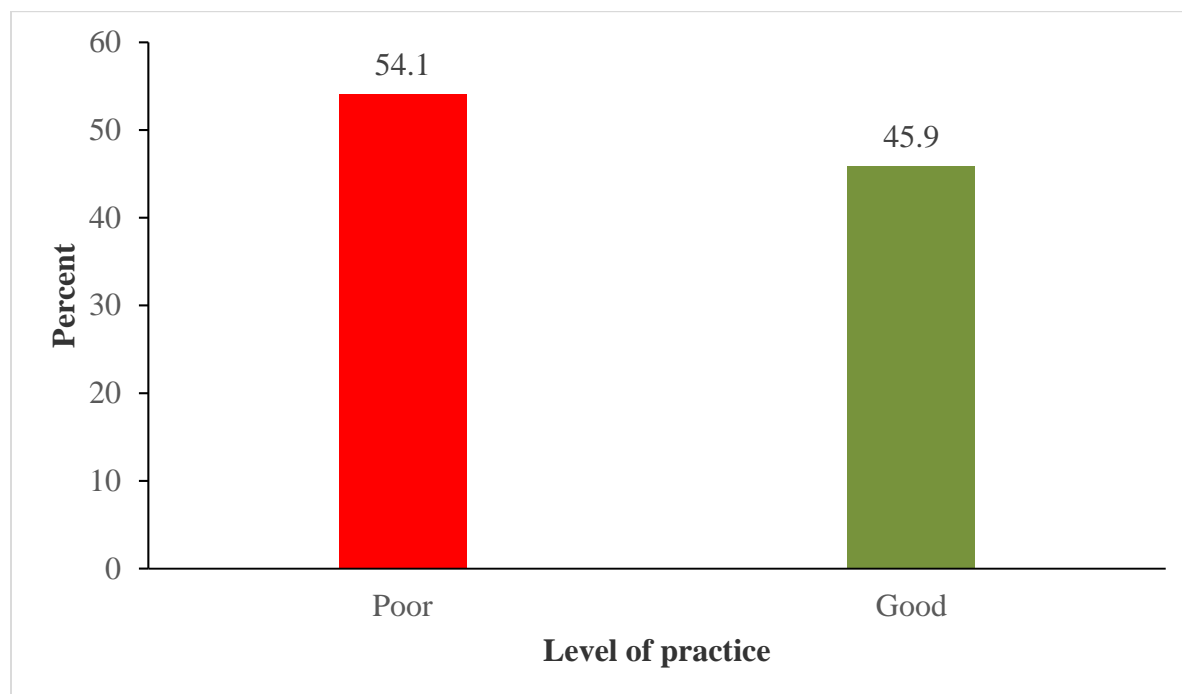

Figure 3: Level of Practice toward MDR-TB Management

Factors related to the practice of Multi Drug Resistant Tuberculosis Management

As shown in Table 5, a bivariate analysis was undertaken to determine the link between demographic factors, level of knowledge, attitude, and practice toward multidrug resistant tuberculosis management. Age (p value = 0.003), training (p value = 0.001), and level of knowledge (p value = 0.001) were significantly associated with practice toward multidrug resistant tuberculosis management.

Table 5: Factors associated with the practice toward MDR-TB Management

Variables	Adequate practice		Inadequate practice		p value
	n	(%)	n	(%)	
Age category					
20-29	2	(25.0)	6	(75.0)	**0.003**
30-39	17	(31.5)	37	(68.5)	
40 and above	37	(61.7)	23	(38.3)	
Sex					
Male	19	(41.3)	27	(58.7)	0.428
Female	37	(48.7)	39	(51.3)	

Profession					
Medical doctor	5	(29.4)	12	(70.6)	0.470
Nurses	42	(50.0)	42	(50.0)	
Midwives	7	(43.8)	9	(56.3)	
Social workers	2	(40.0)	3	(60.0)	
Working Experiences					
1 to 5	24	(52.2)	22	(47.8)	0.585
6 to 10	25	(42.4)	34	(57.6)	
11 to 15	5	(50.0)	5	(50.0)	
<15	2	(28.6)	5	(71.4)	
Being trained					
Yes	26	(68.4)	12	(31.6)	**0.001**
No	30	(35.7)	54	(64.3)	
Level of knowledge					
Poor	25	(32.5)	52	(67.5)	**<0.001**
Good	31	(68.9)	14	(31.1)	
Level of attitude					
Negative	24	(38.1)	39	(61.9)	0.074
Positive	32	(54.2)	27	(45.8)	

Multivariable analysis for factors associated with practice toward MDR-TB Management
The independent parameters connected with management of multi-drug resistant tuberculosis practice were found using logistic regression. All variables with p value less than 0.10 were considered in the multivariable logistic regression including age, training, level of education and attitude. After running this, training and knowledge about MDR-TB were remained significant in the reduced model as shown in Table 6. As indicated in Table 4.5, healthcare professionals who received MDR-TB training were 4.57 times more likely to have adequate MDR-TB management practice (AOR = 4.57; 95% CI = 1.79 - 11.69; p value = 0.002). Similarly, healthcare practitioners with high MDR-TB knowledge were 4.93 times more likely to have adequate MDR-TB management practice (AOR = 4.93; 95%CI = 1.97 - 12.35; p value = 0.001).

Table 6: Multivariable analysis for factors associated with practice toward MDR-TB Management

Variables	AOR	95%CI		p value
		Lower	Upper	
Age category				
20-29	Ref			
30-39	1.90	0.27	13.66	0.523
40 and above	6.16	0.87	43.73	0.069
Being trained				
Yes	4.57	1.79	11.69	**0.002**
No	Ref			
Level of knowledge				
Poor	Ref			
Good	4.93	1.97	12.35	**0.001**

Level of attitude

Negative	Ref			
Positive	2.41	0.99	5.84	0.052

AOR = Adjusted Odds Ratio; CI= Confidence Interval

Discussion

This study targeted healthcare providers at Kibagabaga Hospital and assessed their knowledge, attitude, and practice regarding MDR-TB management. The study sample consisted of 122 participants, the majority of whom (54.3%) were between the ages of 30 and 39, which differs from the findings obtained in a study on tuberculosis conducted by Sima et al in 2019 in which many of the participants were under the age of 30 and the majority (84.9%) were nurses by profession (Sima, Belachew, and Abebe 2019).

According to the study's findings, the majority of respondents (63%) had poor knowledge of MDR-TB management, while less than half (37%) had adequate knowledge, which is likely due to the large number (68.9%) who were untrained in MDR-TB management. These findings were in line with to those discovered in a Lesotho study which revealed that more participants lacked knowledge about MDR TB management (Adebanjo and Malangu 2015). The study's findings are also similar with the study done in Oman were practicing with inadequate knowledge of TB management and diagnosis (Al-Maniri et al. 2010). Furthermore, findings discovered in the Nepalese study, where respondents' knowledge of tuberculosis was generally (Shrestha et al. 2017).

Regarding participants attitude toward MDR-TB management, there was widespread agreement on the importance of preventing MDR-TB spread in the hospital and feeling comfortable requesting MDR-TB diagnosis when symptoms are suspected. Unfortunately, the majority of participants (77.9%) are concerned about being contaminated while caring for MDR-TB patients. On the other hand, the findings of this study contradict individuals of a comparable study led in South Africa about HCP attitudes, in which health care providers were found to have negative attitudes toward their TB patients and some HCPs were found to have a tendency to stigmatize TB patients, which differs from the case of Kibagabaga Hospital, despite the fear of becoming contaminated as noted in HCPs working in TB service at Kibagabaga Hospital (Shrestha et al. 2017).

This study revealed that a large proportion (54%) of Healthcare providers working at Kibagabaga hospital who participated in the study had inadequate practice with regard to MDR TB management. Similarly, a cross-sectional study that assessed health workers' practice of MDR-TB management in Ethiopia, which revealed poor practice (Alene et al. 2019). According to self-stated practices revealed that a large number of participants (53.4%) always refer to guidelines when treating MDR-TB patients, and the majority (91.8%) have their own guidelines.

Following a multivariate analysis, being trained and having good knowledge were association with adequate MDR-TB management practice. Furthermore, a study conducted in Addis Abeba, Ethiopia, discovered a statistical link between having tuberculosis experience, tuberculosis training, and TB practice (Demissie Gizaw, Aderaw Alemu, and Kibret 2015). Furthermore, knowledge of tuberculosis infection control measures, a degree or higher educational level, and having received tuberculosis-related training were significantly associated with good tuberculosis management among Ethiopian health care professionals in the Gamo Gofa zone, southern Ethiopia (Dorji, Tshering, and Wangdi 2020). Additionally, Tadesse et al., (2020) found that MDR-TB Management Do's and Don'ts are not properly recognized, which leads to improper management of TB (Tadesse et al. 2020). Healthcare providers who knew about MDR-TB were 4.93 times more likely to have enough expertise handling MDR-TB. If someone has knowledge, the likelihood of practicing increases. Other research, however, revealed no association between

MDR-TB knowledge and practice (Shrestha et al. 2017). This means that, despite being a precondition, having solid knowledge does not guarantee that healthcare professionals will adopt the right mind-set or the best methods for DR-TB infection control.

Conclusion and Recommendations

The study's findings found a large proportion of healthcare providers with poor knowledge, negative attitude, and poor practice. Multivariable analysis revealed that being trained and having knowledge were related to adequate MDR-TB management practice. It is critical to strengthen the implementation of MDR-TB management by providing healthcare providers with practical training as recommended by World Health Organization. It is critical to provide on-the-job staff training in order to improve MDR-TB management. All healthcare providers could benefit from internal rotation in MDR-TB services to advance their understanding, attitudes, and management of MDR-TB. Further qualitative research at all MDR-TB referral hospitals is required to investigate the factors influencing healthcare providers' knowledge and practice towards MDR-TB.

Conflict of interest

The authors declare that they have no competing interests with this study.

Acknowledgment

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