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Knowledge and Practice on Prevention and Control of Tuberculosis among Nurses Working in Teaching Hospital Lahore

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Abstract

Tuberculosis is a highly infectious illness in Pakistan. The aim of this study was to assess the knowledge and practice of nurses in the prevention and control of tuberculosis infections among nurses working in teaching hospital, Lahore. This cross-sectional study involved the participation of nurses from all sections and outpatient departments at Govt. Said Mitha Hospital, Lahore, and Sir Ganga Ram Hospital Lahore. Data was collected from (n=156) nurses working in each ward and outpatient department of the hospitals using a semi-structured and self-administered survey. Findings revealed that a significant proportion of nurses showed a deficiency in knowledge and used insufficient strategies for the prevention and control of tuberculosis. All nurses reported using a chemical disinfectant called Savlone / chlorine solution to cleanse the room and its surfaces. Nurses who were older than and those who were working in govt. Gangaram hospital Lahore at the time had a higher probability of being aware of TBIPC. Results showed that the training is needed to follow the correct protocols for preventing and controlling TB. That makes them more likely to control tuberculosis. In conclusion, the hospital must ensure the health of the nurses who provide tuberculosis patient care.

Keywords: *Knowledge and Practice, Prevention and Control, Tuberculosis, Nurses, Teaching Hospital, Lahore*

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Introduction

On a global scale, tuberculosis is one of the most dangerous diseases. Lung and other organ infections are found in 85% of Tuberculosis (TB) cases caused by Mycobacterium Tuberculosis (MTB). In terms of global prevalence, it is second only to COVID-19 and HIV/AIDS. In low- and middle-income economies, it accounts for over 95% of tuberculosis deaths, and it is particularly prevalent among young, productive people. In addition to being a major cause of antibiotic resistance, tuberculosis (TB) remains the leading cause of death among HIV-positive individuals. The World Health Organisation (WHO) found that Southeast Asia has the highest rate of tuberculosis cases globally, with 211 cases per 1,000,000 people (WHO, 2021). Tuberculosis is also considered as the largest leading cause of death in Pakistan (Khan et al., 2022). Due to the highly transmissible nature of tuberculosis, front-line nurses and other healthcare professionals are at a higher risk of acquiring the disease while hospitalised (Vigenschow et al., 2021). Due to insufficient personal, environmental, and administrative control measures, the risk of tuberculosis transmission increases (Adhikari et al., 2018).

In addition, prevention of Tuberculosis Infection and Control (TBIPC) procedures, which are well-known and followed by nurses, help reduce the probability of cross-transmission. Several cases show that developing countries do not have enough human, environmental, administrative, and engineering methods to manage and prevent tuberculosis (Adhikari et al., 2019). Due to insufficient isolation rooms for patients with symptomatic HIV-positive tuberculosis and the absence of routine tuberculosis testing for HIV-positive patients (Adhikari et al., 2019), healthcare providers have difficulties preventing cross-infection. Additionally, hospitalised patients and healthcare workers are at increased risk of contracting tuberculosis infections. Hospitalisation for multidrug-resistant tuberculosis is more common among healthcare workers than among the general population (Wang et al., 2018). The TBIPC approaches are the most effective and cost-effective ways to reduce tuberculosis burden.

Moreover, acquiring knowledge about TBIPC measurements can help healthcare practitioners enhance their practice. This can reduce or control the rates of tuberculosis cross-transmission. However, other studies have shown that nurses don't know enough about TBIPC and don't do a good job of using it (Zheng et al., 2020). The World Health Organisation's Stop TB policy places strong emphasis on the need to limit tuberculosis infection (WHO, 2021). This also benefits the health systems by reducing the incidence, mortality rate, and treatment expenses of tuberculosis patients. Through the development of treatment modules and campaigns, Pakistan implemented a comprehensive strategy to decrease tuberculosis cases. There have been major efforts to treat tuberculosis patients at the National Tuberculosis Centre. However, in primary care and hospital settings, there is a lack of emphasis on overseeing the execution of several components, including environmental conditions, engineering measures, personal protection, and administrative safety (Taber et al., 2018). There is a severe lack of research on health professionals' knowledge and use of Tuberculosis Infection Prevention and Control (TBIPC) in Pakistan.

Literature found that health staff do not properly understand or implement TBIPC (Shrestha et al., 2017). Nurses, who treat TB patients and provide primary care to patients, have received little academic attention. This study provides hope that nurses working in settings with limited resources will be better able to understand and use preventative and control measures. Every healthcare professional responsible for treating these individuals is at a significant risk of contracting tuberculosis. It is important for all healthcare staff, especially nurses who have extensive contact with these patients, to have adequate knowledge and adhere to relevant workplace safety standards to maintain health and avoid the spread of the disease. However, the findings can lay the groundwork for the appropriate authorities to establish focused initiatives to enhance nurses' understanding of tuberculosis infection prevention and control, fill knowledge gaps, and promote best practices.

Materials and Method

Study Design, Setting, and Population

This cross-sectional survey enlisted the participation of nurses working in the outpatient departments and wards at Govt. Said Mitha Hospital, Lahore, and Sir Ganga Ram Hospital Lahore. These both hospitals are located in Lahore, Pakistan. In addition to housing 350 patients, both hospitals act as tertiary care facilities in Pakistan. The available administrative data shows that there were 156 nurses employed by the facility. This facility provides care for patients with infectious disorders, such as tuberculosis and HIV/AIDS.

Sampling Method and Sample Size

The study's sample population consisted of the nursing staff and volunteers from Govt. Said Mitha Hospital, Lahore, and Sir Ganga Ram Hospital Lahore, including those who worked inpatient and outpatient. In order to practise nursing, these individuals needed to hold a valid licensure and have earned a nursing competency certificate or higher from a recognised institute. Govt. Said Mitha Hospital, Lahore, and Sir Ganga Ram Hospital Lahore employed 156 female registered nurses overall. All of the nurses were present.

Tools and Techniques for Data Collection

Data Collection Tool

A semi-structured questionnaire was developed in this study that people could fill out on their own after conducting a comprehensive review of the relevant literature. Based on World Health Organisation recommendations for the prevention and control of tuberculosis infection in healthcare settings, this tool was developed. A team of three infectious disease experts from Govt. Said Mitha Hospital, Lahore, and Sir Ganga Ram Hospital Lahore checked the data in the tool. Experts rated the tool based on how well it captured key elements of TBIPC knowledge and practice. Expert opinion has informed changes to the instrument. The instrument was pilot tested with 16 nurses who were eligible to participate from Govt. Said Mitha Hospital, Lahore, and Sir Ganga Ram Hospital Lahore to determine its validity, reliability, and ease of understanding. In order to determine the instrument's internal consistency, Cronbach's alpha was used. The results showed that the levels of practice and knowledge have high reliability. With a total of 26 questions over all three sections, the survey was somewhat lengthy. Both multiple-choice and multiple-response options were provided by these questions.

The first section addresses demographic information by asking about age, education, current ward, job experience, training in infection prevention and control, and usage of immunosuppressive medications. Section II of the thirteen-question test measuring participants' knowledge of Tuberculosis (TB) transmission methods and strategies for individual, organisational, and societal

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control. Health care providers' mask selection and fit testing practices for preventing the transmission of tuberculosis aerosols when coughing, physical distance between themselves and patients suspected of having the disease, proper ventilation, sputum disposal, disinfection of outdoors and indoor rooms, and other related issues were the subjects of these inquiries. In the third section, this study addressed seven questions about TBIPC and how nurses use it. The use of masks in the treatment of tuberculosis patients and those suspected of having TB was the primary focus of the study. Additional objectives included documenting information regarding mask kinds, mask application frequency, and correct OPD / Indoor /isolation room disinfection procedures.

Data Collection Procedure

The Govt. Said Mitha Hospital, Lahore, and Sir Ganga Ram Hospital Lahore Institutional Review Committee provided the necessary ethical approvals before conducted the study. We consulted the appropriate hospital authorities to obtain authorization before collecting any data. The data was collected in February, 2024. Before starting data collection, this study communicated the study's goals and procedures to the participants. We informed a participant that they could opt out of the study at any stage of the data collection procedure, without providing a reason or prior notice. Researcher provided the questionnaire to the nurses at their workplace, allowing them to complete it at their convenience. Researcher promptly collected the forms the following day after receiving their written informed consent. The survey took an average of 20 minutes to complete. Data was protected the records with a code that linked the respondent to the completed questionnaire, ensuring privacy.

Data Processing and Analysis

One hundred fifty-six people filled out the survey. This study examined the data collection site to identify any mistakes or missing information. Then, addressed any discrepancies by asking the respondent to confirm or complete the questionnaire. After that, the data was codified, organised, and loaded into SPSS version 25. Each possible answer in Multiple-Response Questions (MRQs) is worth one point, whereas the correct answer in Multiple-Choice Questions (MCQs) is worth a point. We awarded a single point for each correct selection. We classified the proficiency level using the mean due to the frequent dispersion of the data. This study administered a knowledge-based multiple-choice question to the nurses to determine their level of knowledge. In the end, results produced a mean score of 13.39.

A score below the mean indicated ignorance, whereas scores above the mean indicated adequate comprehension. The present study assigned a score of one to the correct answer to practice-related questions, considering its weight. A significance level of $p < 0.05$ was established. Only nurses with direct patient care experience with pulmonary tuberculosis could access three of the practice questions. This study analysed the data using descriptive statistics. These statistics comprised measurements like the standard deviation, mean, percentage, and frequency. This study also used binary logistic regression, an inferential statistical method, to identify the variables associated with nurses' knowledge of TB infection prevention and control.

Results

Table 1. Demographic Characteristics of Participants

Variables	**f**	**%**
Age		
20-40 Years	132	84.6
41-50Years	24	15.4
Current Working Ward/OPD		
With Isolation Rooms	61	39.1
Without Isolation Rooms	95	60.9
Education		
PCL Nursing	94	60.2
Bachelor of Nursing	55	35.3
Master of Nursing	07	4.5
Work Experience		
< 1 Year	35	22.4
2-4 Years	58	37.2
5-6 Years	26	16.7
> 6 Years	37	23.7
Training on Infection Prevention		
Got Training	42	26.9
No Training	114	73.1

Note: f= Frequency, %= Percentage

Table 1 shows that the age range of the majority of the participants (84.6%) was 20–40 years old. Most of the participants (60.9%) are working in the isolation room. The majority of participants (73.1%) did not obtain training on infection prevention.

Table 2. Level of Knowledge of Nurses about the Prevention and Control of TB

Level of Knowledge	**f**	**%**
Adequate Knowledge	102	65.4
Inadequate Knowledge	54	34.6

Note: f= Frequency, %= Percentage

Table 2 shows that 65.4 percent of participants have adequate knowledge and 34.6 percent have inadequate knowledge about TB prevention and control.

Table 3. Practice of TB Infection and Prevention among Nurses

Practice	**f**	**%**
Wear a mask during care suspected of TB	156	100
Type of mask worn		
Disposable Mask	92	59
Surgical Only	24	15.4
Cloth/Surgical	40	25.6

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Frequency of Mask Worn		
Always	19	12.2
Often	66	42.3
Sometime	65	41.7
Rarely	6	3.8
Ever cared for a patient with pulmonary tuberculosis in the hospital	135	86.5
Disposable Mask	7	5.2
Surgical Only	83	61.5
Cloth/Surgical	45	33.3
Use of mask while caring for patients with pulmonary tuberculosis in the hospital		
Disinfection of the room with liquid/liquefied chemical disinfectants (Savlone /chlorine solution)	135	100

Note: f= Frequency, %= Percentage

Table 3 shows that the majority of the participants (59%) used cloth-only masks during the practice of TB infection and prevention. Most of the participants (42.3%) frequently wear masks while practicing TB infection and prevention.

Table 4. Association of background information with the knowledge of nurses about prevention and control of TB

Characteristics	**p**	**AOR#**	**CI**
Age			
20-40 Years			
41 Years and Above	0.00***	5.96	2.08-17.45
Level of Education			
PCL Nursing			
Bachelor and above	0.12	1.79	0.84-3.83
Work Experience			
Up to 5 Years			
More Than 5 Years	0.32	1.51	0.66-3.48
Working Wards			
With Isolation Rooms			
Without Isolation Rooms	0.01**	2.68	1.26-5.71
Training on Infection Prevention and Control			
Not Received Training			
Received Training	0.30	1.56	0.66-3.66

Note: p= Significant Value, CI= Confidence Interval

Table 4 shows that age and working ward have a significant effect on the association of background information with nurses' knowledge about TB prevention and control.

Discussion

In Pakistan, tuberculosis is a common and serious disease. In Pakistan, 83% of tuberculosis (TB) patients end up in the hospital for treatment, and the average length of stay is 11 days (Khan et al., 2022). These patients are particularly at risk of contracting tuberculosis from the healthcare workers who treat them. Healthcare workers can effectively control the infection if they receive comprehensive education on tuberculosis prevention and control and implement this knowledge. This survey found that just 34.6 percent of nurses had sufficient knowledge to effectively prevent and control TB. Furthermore, 82.1% of respondents believed that a surgical mask could shield them from the tuberculosis aerosol they cough up. This indicates their lack of knowledge about the existence of standard masks designed to shield against tuberculosis aerosol.

The percentage of nurses who correctly recognised the healthiest patients was just 21.8%. Furthermore, while 28.8% of people correctly identified the disinfection system in isolation rooms, only 5.8% understood the ventilation system. A lack of knowledge about tuberculosis increases the risk of infection and transmission among nurses, who may not take adequate measures to prevent and control the spread of the disease. This finding is consistent with the previous studies (Buregyeya et al., 2016; Rensburg et al., 2018). The absence of consistent in-service training and the improper assignment of nurses based on their specialization and level of education may be the cause. If there had been no TBIPC policy, the administration may have invested less in educating nurses on tuberculosis prevention and control. Hence, it is important to educate nurses in TBIPC on a regular basis and assign them to wards based on their skills and expertise.

In addition, implementing and strictly enforcing the TBIPC policy's numerous administrative, engineering, environmental, and PPE-related precautions should protect medical staff treating tuberculosis patients from potential harm. Inadequate reinforcement of previously learned material may also have contributed to the information gap that may have developed as a result of the disparity between nursing education and practice in South Asia (Rensburg et al., 2018). These results, however, run counter to those of studies involving nurses and other medical professionals in Asian countries. Findings of a previous study showed that most medical professionals have a solid grasp of TB infection prevention and control measures (Bhebhe et al., 2014). Consistent results may not always be possible because of differences in the sample or environment. Further, a surgical or cotton mask is no longer acceptable for patient care due to changes to the minimum threshold, which requires the use of an FFP2 or N95 mask.

Among the 135 nurses who reported caring for patients with pulmonary tuberculosis at that facility, 61.5% said they used a disposable mask, but not a single one could recall ever using a N95 mask. These findings go counter to what (Baral & Koirala, 2022) found in their earlier research. Because of the different settings, we can expect conflicting results. There isn't a specific isolation unit for infectious patients at the Said Mitha and Sir Ganga Ram Hospitals. Also, because infectious diseases are so common in Pakistan, the government hospitals there have to make do with less money and less resources. The management team may not have paid enough attention to stocking personal protective equipment, especially the N95 mask, which is significantly more expensive than a surgical mask, if the hospital lacked a TBIPC policy. Due to

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this situation, the availability of N95 masks for hospital staff may have been severely limited or non-existent. Out of the 156 nurses with experience caring for pulmonary tuberculosis patients, 135 admitted to disinfecting the room with Savlone / chlorine solution, a chemical liquid or liquefied solution.

This cleaning procedure does not effectively eliminate aerosols, which increases the likelihood of tuberculosis cross-transmission. Therefore, the potential for cross-transmission endangers the health of the medical personnel as well as the other patients housed in the isolation unit. The hospital's TBIPC policy should incorporate guidelines and procedures for decontaminating isolated rooms. Moreover, the current study found that nurses aged 40 and up were significantly more conscious than those aged 40 and below. This finding is aligned with a prior study, (Temesgen & Demissie, 2014) found that there is a positive correlation between age and the acquisition of information, which is consistent with our findings. The majority of hospitals staff their wards with senior ward nurses, who are typically 40 years old and up. Those in this role have more opportunities for advancement and better access to resources like continuing education and professional development programs. In addition, senior nurses often have worked their way up through the ranks and have experience in a variety of isolation units and departments. Exposure to Tuberculosis Infection Prevention and Control (TBIPC) would have better equipped them to understand the disease and take preventative measures.

Nurses who worked in isolation units throughout the research were more likely to have extensive knowledge than those who did not. One possible explanation is that the nurse has a deeper understanding of the methods she uses to stop the spread of tuberculosis. Nonetheless, this investigation did not discover that training or a degree of education were predictors of knowledge. This contradicts the results of an Ethiopian study that identified a correlation between TB-IPC training and high levels of comprehension (Hong, 2018). A prior study revealed similar results for a South African study that found no correlation between TB prevention training and knowledge (Ekuma & Oridota, 2016). It is possible that these changes are associated with variations in the sample and its environment. Nursing education and practice in Pakistan is behind schedule, and there is a mismatch between what nurses learn on the job and what they really do for a living, which could lead to a loss of knowledge and an underutilization of what nursing students have learned (Mussi et al., 2012). These factors may have contributed to the nurses' ignorance of tuberculosis infection prevention and control. To achieve this goal, educational reform and consistent in-service education for nurses are necessary. Assigning nurses to positions that make the most of their training, experience, and area of specialization is also important, as is reducing the gap between theory and practice.

Limitation of the Study

We conducted this study only in government hospital. Therefore, other hospitals will not provide the same results. Recall bias is a potential problem that requires consideration, as the replies to the knowledge questionnaire rely on the recollection of previously provided information and facts. Therefore, the results of the study have limited applicability to a broader population.

Conclusion

According to the results, nurses aren't well-versed in tuberculosis prevention and control measures. Isolation unit nurses with more than 40 years of experience have the most advanced training. In order to ensure that the personnel maintain their skills, the hospital should organise and carry out the required nursing education and training on tuberculosis prevention and control. In addition to providing placement recommendations for nurses based on their individual skills and training, it is essential to develop and execute the hospital's policy for preventing and controlling tuberculosis infections. The National Tuberculosis Centre needs to put a framework in place to keep tabs on how institutions that deal with tuberculosis are doing when it comes to preventing and controlling the disease. Healthcare facilities should develop and implement appropriate training and education programmes for nurses to ensure that they maintain their expertise. Furthermore, a thorough framework and organisational rules are required to ensure that healthcare providers' TB prevention and control efforts are well-monitored and supported.

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