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Assessing the Knowledge, Attitude and Practices of Nurses in Implementing Infection Control Measures for Tuberculosis in Hospital: Literature Review

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ABSTRACT

Background: Tuberculosis (TB), caused by Mycobacterium tuberculosis, remains a major global health concern, particularly for healthcare workers (HCWs) who are at increased risk due to occupational exposure. This study evaluates nurses' knowledge, attitudes, and practices (KAP) in implementing TB infection control measures in hospital settings across Ethiopia, Zimbabwe, Nepal, Saudi Arabia, India, Gabon, and Malaysia. Despite the availability of preventive measures, their inconsistent application due to inadequate training, resource shortages, and systemic challenges continues to hinder effective TB control. Identifying these gaps is crucial for improving infection prevention strategies.

Purpose: This study aims to assess nurses' KAP regarding TB infection control, identify critical gaps in their understanding and practices, and highlight the need for targeted interventions such as in-service training, resource allocation, and stigma-reduction efforts.

Methods: A literature review was conducted on studies published between 2020 and 2024 using the PubMed, ProQuest, and Scopus databases. The inclusion criteria focused on studies involving nurses in hospital settings that discussed knowledge, attitudes, and practices related to TB prevention. The 340 articles identified, 29 articles met the eligibility criteria after applying strict exclusion criteria for duplicate and non-empirical publications and studies that did not specifically focus on nurses in hospitals. To ensure accuracy and credibility, the included studies were assessed using the critical appraisal tool from the Joanna Briggs Institute (JBI) to minimize the risk of bias.

Results: Findings revealed substantial gaps in nurses' knowledge and infection control practices, despite generally positive attitudes. For instance, many incorrectly relied on surgical masks instead of N95 respirators. Inconsistencies in infection control were linked to inadequate training, resource limitations, and high workloads.

Conclusion: Addressing these deficiencies through structured training, improved resource distribution, and stigma-reduction strategies is essential to enhance TB prevention efforts in hospital settings.

Keywords: attitude, hospital, infection control, knowledge, nurse, tuberculosis

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BACKGROUND

Tuberculosis, caused by Mycobacterium tuberculosis, remains a significant global public health burden in the 21st century, with an estimated 10.6 million cases and over 1.6 million deaths reported annually (Marme et al., 2023). In this global context, healthcare workers especially nurses are at higher risk of Tuberculosis infection due to continuous occupational exposure in hospital settings (Paleckyte et al., 2021). Clinically, Tuberculosis manifests primarily as a pulmonary disease, accounting for approximately 85% of all cases, although extrapulmonary involvement of organs such as lymph nodes, meninges, bones, joints, and the genitourinary system has also been well documented (Marme et al., 2024). Although the disease profile is well established and effective infection control strategies are available, the implementation of tuberculosis prevention measures remains inconsistent, mainly due to a lack of knowledge, poor adherence to recommended practices, inadequate training, stigma, and persistent resource constraints (Karanja et al., 2024; van der Westhuizen et al., 2022).

The World Health Organization (WHO) 2023 report indicates that 1.25 million individuals succumbed to tuberculosis, including 161,000 individuals co-infected with HIV (Global Tuberculosis Report 2023, n.d.). Worldwide, tuberculosis has probably returned to being the world's leading cause of death from a single infectious agent, following three years in which it was replaced by coronavirus disease (COVID-19) (… et al., 2020). It was also the leading killer of people with HIV and a major cause of deaths related to antimicrobial resistance tuberculosis remains a global public health threat affecting millions of people every year (1999), 1999).

The prevalence of tuberculosis among individuals employed in communal environments such as laboratories, tuberculosis clinics, and wards surpasses that of the general populace, This heightened risk of tuberculosis transmission within healthcare facilities places healthcare workers (HCWs) and other patients at significant risk of infection (Tadesse et al., 2020). Health care workers (HCWs) are essential in global combat against tuberculosis. However, they face a significant risk of tuberculosis infection due to frequent exposure to tuberculosis patients (Main et al., 2022). A recent meta-analysis revealed that health care workers have an incidence of active tuberculosis approximately three times higher than that of the general population. Consequently, the implementation of occupational tuberculosis prevention and infection control (TBIC) measures in healthcare facilities is critically important (Sharma et al., 2021). The inadequate execution of tuberculosis prevention and control measures may affect both latent tuberculosis infection and active disease among healthcare workers in low-income, high tuberculosis-burden environment (Min et al., 2022). The variables contributing to the suboptimal implementation of tuberculosis measures are as follows: the deficiency of policies, inadequate knowledge, excessive workload, and insufficient training (Nazneen et al., 2021).

Understanding these problems is crucial, as tuberculosis continues to be a significant worldwide health concern. Healthcare professionals, particularly nurses, face an elevated risk of tuberculosis infection due to frequent exposure inside the hospital setting. Despite the availability of tuberculosis preventative strategies, their implementation remains suboptimal due to insufficient information, poor adherence to recommended procedures, and systemic obstacles like inadequate training, stigma, and resource limitations (Paleckyte et al., 2021). This study seeks to evaluate nurses' knowledge, attitudes, and practices regarding the implementation of tuberculosis infection control measures in hospitals, while also identifying competency deficiencies that require attention.

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OBJECTIVE

This research aims to assess the Knowledge, Attitude and Practices of nurses in implementing Infection Control Measures for Tuberculosis in Hospitals and seeks to address the deficiencies in nurse knowledge and competencies related to tuberculosis prevention in hospital setting.

METHODS

This literature review followed a structured process that included defining the research question, identifying relevant studies, appraising the quality of selected articles, and synthesizing and interpreting the findings. Search strategies and sources were systematically documented, and references were managed using the Mendeley application. Articles were categorized as included or excluded based on relevance to topic, population, and study design. The guiding research question examined nurses' knowledge, attitudes, and practices regarding the implementation of tuberculosis infection control measures in hospital settings.

1.1 Data Sources

Data was obtained from several databases such as ProQuest, PubMed, and Scopus from 2020 to 2024. In the journal search, the keywords used were Nurse, Knowledge, Attitude, Tuberculosis, infection control, hospital.

1.2 Search Strategies

The Strategies for identifying high-quality articles employed inclusion and exclusion criteria. Inclusion Criteria: Participants: Nurses working in hospital settings involved in tuberculosis infection control. Types of Studies: Original research publications encompassing cross-sectional studies, qualitative research, mixed-method studies, and descriptive surveys. Variables of Interest: Research investigating the knowledge, attitudes, and practices (KAP) of nurses concerning tuberculosis infection prevention and control. Language of Publication: Research disseminated in English. Exclusion Criteria: Participants: Studies that include non-nurse healthcare personnel or groups unrelated to tuberculosis infection control. Types of Studies: Commentaries, editorials, theses, conference abstracts, and other writings lacking primary research data. Variables of Interest: Research that fails to examine Knowledge, Attitudes, and Practices (KAP) or tuberculosis prevention inside hospital environments. The screening and selection process was conducted in two phases, title and abstract screening followed by full-text review and was independently performed by two reviewers, with discrepancies resolved through discussion.

1.1 Study selection results:

The selection process shows that a total of 340 articles were identified during literature review from the database. After removing duplicates, 315 articles remained. A total of 281 articles were excluded after checking the title/abstract with non-relevant topics, 11 non-relevant population, non-relevant articles 158, and not relevant study design 55, the included studies were 29, researcher then conducted a quality assessment of 29articles. A total of 9 articles that met the inclusion criteria were included in the literature review.

1.3 Data synthesis

The comparison of literature that satisfied the quality assessment criteria, along with inclusion and exclusion parameters, facilitated the synthesis process of this study. The data pertained to the researcher's objective of assess the Knowledge, Attitude and Practices of nurses in implementing Infection Control Measures for Tuberculosis in Hospitals and seeks to address the deficiencies in nurse knowledge and competencies related to tuberculosis prevention in hospital setting.

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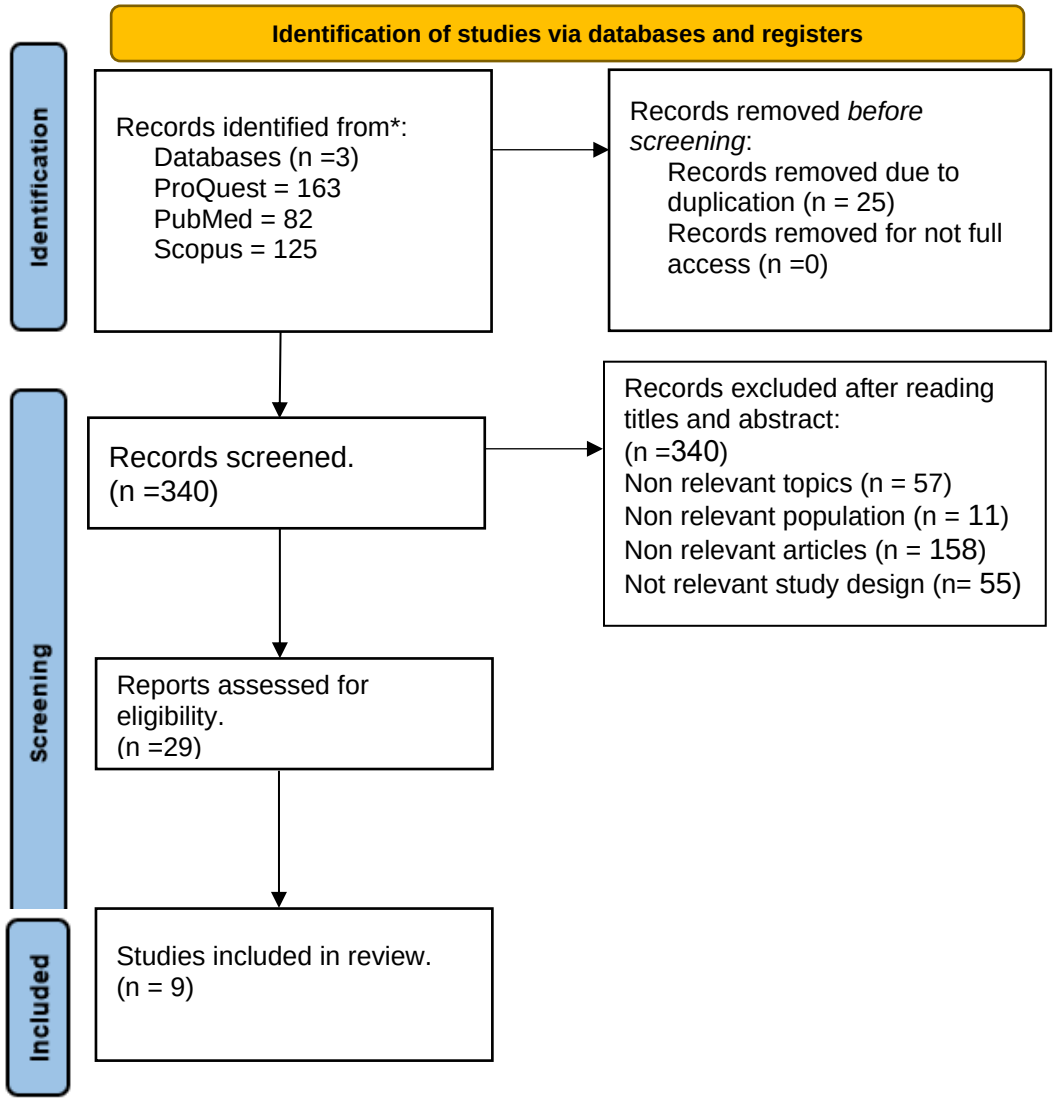
PRISMA



Data Extraction

Author (year), country	Design	Participant		Intervention		Measurement tools	Outcomes
		Number E/C	Mean age, total E/C	Method	Duration		
Eba Abdisa Golja (2020), Ethiopia (Golja,2020)	cross-sectional study.	223	20 – 59	Self-administered structured questionnaires	From September to October 2019.	semi-structured questionnaire.	The study revealed several key outcomes regarding healthcare workers' (HCWs) knowledge, attitudes, and practices toward tuberculosis (TB) infection control. A significant proportion of HCWs demonstrated good knowledge, with 78.5% showing a positive attitude toward tuberculosis infection control. However, only 70% exhibited good practice, which is higher than some other studies but still indicates room for improvement. Notably the majority (172, 86%) of the respondents knew that "Regular screening of HCWs for tuberculosis is one of the tuberculosis infection control measures and 110 (55%) of participants incorrectly believed that surgical masks could protect them from inhaling tuberculosis droplets, highlighting a gap in understanding.

Emmanuel Gasaba et al. (2020), Zimbabwe (Gasaba et al., 2020).	Cross-sectional study.	39	27 – 55	Self-administered questionnaire.	Not Reported.	Structured questionnaire\e (Reliability: Cronbach's alpha coefficient = 0.7935).	The study revealed that healthcare workers, particularly nurse aides, exhibited poor knowledge regarding infection control measures, despite demonstrating a fair attitude and practice towards these measures. Specifically, the participants scored over 50% in their attitudes and practices related to infection control, indicating a generally positive outlook. However, the knowledge aspect was lacking, which highlights a significant gap that needs to be addressed. The findings suggest that in-service training and workshops are essential to enhance the knowledge of healthcare workers and ensure full compliance with infection control practices. This recommendation is crucial for improving overall healthcare safety and reducing the risk of hospital-acquired infections (HAIs) among patients and staff alike.
Stephanie Main et al. (2022), Indonesia (Main et al., 2022).	Cross-sectional study.	290	17 - 49	Electronic survey distributed via WhatsApp.	From December 2020 to February 2021.	Knowledge section with 11 multiple-choice questions. Attitude section using a 5-point Likert	The study revealed that average tuberculosis knowledge score among participants in this study was 7.2 out of 11 (SD 1.5), with higher scores observed among medical staff and those holding university

						scale.	degrees, showing increases of 0.53 and 0.38 points, respectively. Almost all the participants (99.7%) knew that tuberculosis is contagious and that it can be cured. However, there were big gaps in their knowledge about how the disease spreads (only 43.9% got it right), how to stop it from spreading (24.1%), and what role preventive therapy plays (59%). Most healthcare workers (HCWs) believed tuberculosis patients received sufficient support during diagnosis (92%) and treatment (84%), with 73% disagreeing that these patients faced social stigma.
Mira Adhikari Baral 1 and Sumitra Koirala (2022), Nepal* (Baral & Koirala, 2022a).	Cross-sectional study.	156	40 years and above.	Semi-structured self-administered questionnaire.	From 3 October 2021 to 27 December 2021.	Semi-structured questionnaire + Cronbach's alpha.	The study revealed that a significant majority of nurses exhibited inadequate knowledge and poor practices regarding the prevention and control of tuberculosis, which increases their risk of infection and cross-transmission. Specifically, only about one-third of the nurses (34.6%) demonstrated adequate knowledge of tuberculosis prevention and control measures. While all nurses recognized coughing as a

							mode of tuberculosis transmission, their understanding of protective measures was lacking; only 20.5% acknowledged the protective role of N95 masks, and none reported using them while caring for tuberculosis patients. Furthermore, the study highlighted that nurse aged 40 years and older and those working in isolation units had better knowledge levels.
Ahmed M. Al-Ahmari et al. (2021), Saudi Arabia (KSA (Al-Ahmari et al., 2021).	Cross-sectional study.	212	less than 30 years.	An electronic questionnaire.	(range: 9–14 months)	Questionnaire.	The study relevant that most of the people who participated had positive views on infection control. In fact, 88.2% of them had positive views on the policies and methods for infection control. 58% strongly agreed that normal precautions keep people from getting infections, and 72% agreed that gloves and good hand hygiene can help stop the spread of germs. But it was found that there were big gaps in understanding and practice. While 31.6% of the people who participated didn't know much about preventing infections, almost half of them (49.5%) didn't follow basic precautions very well. There were no significant

							differences in knowledge or attitude based on socio-demographic characteristics.
K. M. Jaiswal et al. (2020), India (Jaiswal et al., 2020).	Cross-sectional study.	103	<40 = 46.66% 40 = 35.92%	Cross – sectional.	Not Reported.	Structured questionnaire.	The study revealed significant gaps in knowledge, attitudes, and practices of healthcare professionals (HCPs) regarding tuberculosis (TB) care and control. It was found that the average practice score among the 103 HCPs was only 2.55 out of a possible higher score, indicating poor practice competencies. Interestingly, contrary to expectations, those with less than one year of experience had the highest average practice score of 3.25, while those with more than ten years of experience scored the lowest at 2.00.
Anja Vigenschow et al. (2021), Gabon (Vigenschow et al., 2021).	Cross-sectional study.	103	Not reported	Survey questionnaire.	Conducted between November 2016 and 2017.	Survey questionnaire.	The study revealed that healthcare workers in Moyen-Ogooué Province, Gabon, exhibited varying levels of knowledge regarding tuberculosis, with 40.8% scoring 'intermediate knowledge', 28.2% 'good knowledge', 21.4% 'poor knowledge', and only 9.7% achieving 'excellent knowledge'.

							Despite generally positive attitudes towards tuberculosis infection control, a significant portion of participants (72.8%) expressed fear of contracting tuberculosis, and an overwhelming 98.1% acknowledged the need for improved local tuberculosis control measures. However, the study found that infection control practices were not consistently implemented, indicating a gap between knowledge and practice.
Hafridz Murshid al-Wafi Shahbuddin et al. (2022) Malaysia (Murshid et al., 2022).	Cross-sectional study.	75	It is not explicitly stated, but is noted at 81% of the respondents were aged less than 30 years old.	self-administered questionnaire.	Not Reported.	Survey.	The study revealed that while healthcare providers in the Medical department of Hospital Ampang demonstrated good knowledge about tuberculosis, significant knowledge gaps were identified, particularly regarding the populations at risk for tuberculosis infection, with only 20% of respondents aware of these groups. Additionally, a high level of perceived stigma was noted, as 82% of participants felt that the community would not accept tuberculosis patients well, and 12% indicated they would change their relationship with someone diagnosed with tuberculosis. Furthermore,

							despite the majority perceived tuberculosis as a health threat and expressing a willingness to seek medical care if they developed symptoms, a small proportion (5.3%) would keep their tuberculosis status a secret. These findings highlight the need for targeted educational interventions to address knowledge gaps and reduce stigma surrounding tuberculosis among healthcare providers.
Zeredo, N. V. et al. (2022), Brazil (Azeredo et al., 2022).	Retrospective record review.	53	≤ 48	Retrospective Record Review.	From 2005 to 2018.	Electronic health records.	The study demonstrated a significant reduction in tuberculosis (TB) incidence among health care workers (HCWs) following the implementation of infection-control measures (ICM). Specifically, the incidence decreased from 100.0 cases per 100,000 HCWs per year before the intervention to 26.2 cases per 100,000 HCWs per year after the ICM were put in place, with a statistically significant p-value of less than 0.0001. This finding underscores the effectiveness of comprehensive ICM, which included a written tuberculosis infection-control plan, monitoring, screening, training, and

education, in significantly lowering the incidence of tuberculosis among health care workers. The results highlight the importance of regular monitoring and the establishment of robust infection-control protocols to protect health care personnel from tuberculosis exposure and infection.

RESULTS

Knowledge of Tuberculosis Infection Control

Multiple studies highlight significant gaps and variations in nurses' knowledge of tuberculosis infection control across different countries This pattern is reflected in a cross-sectional study done in Ethiopia with 223 healthcare workers found that 78.5% knew enough about preventing tuberculosis infections to be useful, but 45% were wrong when they thought that surgical masks could protect against tuberculosis droplets, showing major knowledge gaps (Golja, 2020). A cross-sectional study done in Saudia Arabia found that most participants held favorable opinions regarding infection control. Indeed, 88.2% of them expressed favorable views of the policies and techniques for infection control. 58% strongly concurred that standard measures prevent individuals from acquiring infections, while 72% acknowledged that gloves and proper hand cleanliness can mitigate infection transmission (Al-Ahmari et al., 2021). A cross-sectional study done in Zimbabwe found on significant gaps in participants' knowledge of infection control, with only 34.5% able to define hospital-acquired infections (HAIs) and just 24.1% familiar with standard precautions. However, participants demonstrated stronger understanding in recognizing infectious body fluids and identifying the need for isolation rooms for patients with infectious diseases (Gasaba et al., 2020). A cross-sectional study done in Indonesia revealed that 99.7% know that tuberculosis is infection disease, and 97.2% know that it is curable, and 59% of the participants recognized the importance of the role of preventive therapy and the financial resources allocated to health organizations play a crucial role in infection control, highlighting the importance of conducting comprehensive training programs for newly recruited healthcare professionals (Main et al., 2022). Other study in Nepal, found that only 34.6% of 156 nurses in Nepal knew enough about how to prevent tuberculosis, and Many nurses misunderstood protective measures, with 82.1% incorrectly believing that a surgical mask protects against tuberculosis droplet nuclei (Baral & Koirala, 2022a).

Attitudes of Infection Control Measures

Overall, cross-sectional studies conducted across different countries indicate that healthcare workers generally demonstrate favorable attitudes toward infection control; however, gaps in knowledge, practices, and psychological readiness remain evident. A cross-sectional study found that although nurses had positive attitudes and actions, their knowledge was inadequate, underscoring the necessity for in-service training (Gasaba et al., 2020). Another cross-sectional study in Ethiopia found that although 78.5% of participants expressed favorable attitudes toward infection control, their actual practices remained inadequate (Golja,

2020). Similarly, a cross-sectional study in Saudi Arabia reported that despite 88.2% of healthcare workers demonstrating positive attitudes toward infection control measures, only half of the participants exhibited adequate infection control practices (Al-Ahmari et al., 2021) . Another cross-sectional study in Gabon found that, despite predominantly favorable attitudes, 72.8% of healthcare personnel reported fear and anxiety related to tuberculosis transmission, indicating psychological barriers specifically fear of infection and perceived personal risk—that hinder effective infection control practices (Vigenschow et al., 2021).

Implementation of Infection Control Practices

Overall, existing cross-sectional studies indicate substantial gaps between healthcare workers' knowledge of tuberculosis infection control and the consistent application of these practices in clinical settings. A cross-sectional study found that there is a significant disparity existed between theoretical knowledge and its actual implementation in several research and discovered that while most nurses identified coughing as a transmission method for tuberculosis, merely 20.5% recognized the defensive function of N95 masks (Baral & Koirala, 2022b). Other cross-sectional study found that although 98.1% of participants acknowledged the necessity for enhanced tuberculosis control measures, infection control methods were used inconsistently (Vigenschow et al., 2021). Another cross-sectional study in India noted inadequate practice abilities among 103 healthcare practitioners, achieving an average practice score of merely 2.55 out of a higher potential score. Notably, individuals with less than one year of experience outperformed their more seasoned colleagues, underscoring unforeseen deficiencies in practical application among experienced professionals (Jaiswal et al., 2020).

DISCUSSION

Our study found that nurses' knowledge regarding tuberculosis infection control remains inadequate, with substantial and persistent gaps identified across the reviewed studies. Specifically, a notable proportion of healthcare workers incorrectly believed that surgical masks provide protection against airborne tuberculosis, with 45% holding this misconception. This finding directly addresses the study objective of evaluating knowledge adequacy and indicates insufficient understanding of airborne transmission mechanisms and appropriate respiratory protection (Baral & Koirala, 2022b). These findings align with a similar study conducted in Thai and Indonesia, which reported widespread misconceptions regarding the protective role of surgical masks and limited awareness of N95 respirator use in tuberculosis prevention (Apriani et al., 2022; Wangsan et al., 2025). Furthermore, these findings align with another studies reporting poor understanding of appropriate glove use, including unnecessary glove application and failure to change gloves correctly, which increases the risk of cross-contamination and inefficient resource utilization (Eronen et al., 2024; Olorunfemi et al., 2023). Collectively, our findings suggest that inadequate foundational knowledge may undermine effective infection control practices and highlight the need for structured education programs, continuous professional training, and institutional monitoring systems.

Our study found that a significant proportion of healthcare workers had incorrect knowledge about tuberculosis prevention, with 45% mistakenly believing that surgical masks provide protection against airborne tuberculosis droplets (Baral & Koirala, 2022b). These findings align with the findings of another study which also was focused on the knowledgement about poor understanding of proper glove use among HCWs, with issues such as using gloves unnecessarily or failing to change them correctly, leading to cross-contamination and resource waste, the findings underscore the urgent need for targeted education and training for nurses to enhance their knowledge and practices related to tuberculosis infection prevention and control, as well as the implementation of supportive policies and monitoring systems in healthcare settings (Eronen et al., 2024; Olorunfemi et al., 2023).

Our study highlights the critical role of preventive measures in infection control, with 72% of healthcare professionals in Saudi Arabia recognizing that proper hand hygiene and the use of gloves significantly reduce the risk of infection transmission (Al-Ahmari et al., 2021). These findings align with a similar study conducted in Uganda, where 85.1% of healthcare professionals acknowledged the importance of handwashing, and 82.0% understood the necessity of changing gloves between patients, even in the absence of visible dirt or contamination (Ebere Emilia et al., 2024). Our study identified substantial knowledge gaps among participants in Zimbabwe, with only 34.5% accurately defining hospital-acquired infections. However, they demonstrated an understanding that infectious diseases can spread through body fluids and acknowledged the necessity of isolation rooms, particularly for individuals with tuberculosis (Gasaba et al., 2020). These findings align with the findings of another study, which identified 25 tuberculosis index cases where delayed isolation led to 157 secondary cases (Feng et al., 2024). Another study conducted in Turkey indicated that most healthcare workers are aware of the role of body fluids in the transmission of infectious diseases (Meregildo-Rodriguez et al., 2024). Furthermore, despite shortcomings in post-exposure management, most healthcare workers acknowledged the dangers of body fluid exposure and its potential health implications (I. et al., 2023)

Our study found that healthcare workers in Indonesia possess strong knowledge, with 99.7% of respondents recognizing tuberculosis as both contagious and curable. Additionally, the findings underscore the significant impact of health institution budgets on effective infection control measures (Main et al., 2022). These findings align with the findings of another study where 85% of healthcare workers in India demonstrated strong knowledge of tuberculosis (Shihora et al., 2024). Also, a study conducted by in China, which highlighted that equipping health organizations with infection prevention tools necessitates substantial financial investment (Xiong et al., 2023). Two studies conducted in Ethiopia and Zimbabwe found that although most participants demonstrated positive attitudes toward infection control, their actual practices remained inadequate, highlighting a critical gap between knowledge and implementation that requires training (Gasaba et al., 2020; Golja, 2020). These findings align with the findings of another study that conducted Iraq, where 66.7% of nurses reported a fair level of practices regarding infection control measures, their adherence was inadequate for the emergency department's critical nature, highlighting the need for more training programs to improve compliance (Hassan Khudhur & Majid Abdul-Wahhab, n.d.). Two studies found that most healthcare professionals in Saudi Arabia and Gabon had positive attitudes towards infection control methods; nevertheless, only %50 percent of participants demonstrate suitable practices (Gasaba et al., 2020). These finding align with the findings of study another study that conducted in India where 81% of healthcare workers had a positive attitude towards infection control and only 50% of them knew the correct sequence for wearing personal protective equipment (PPE), indicating a gap in the attitude aspect (Sasapu & Kumar, 2023).

Our analysis indicates that years of experience do not necessarily correlate with the knowledge levels of healthcare professionals. A study conducted in India, involving 103 healthcare practitioners, revealed significant inadequacies in practical competencies, with an average practice score of only 2.55 substantially lower than the expected standard. Interestingly, professionals with less than one year of experience outperformed their more seasoned counterparts, highlighting an unexpected gap in practical proficiency among experienced practitioners (Jaiswal et al., 2020).

CONCLUSION

The study highlights to the critical role of nurses in tuberculosis (TB) infection control in hospital settings while also revealing significant impediments to best practices. These

inadequacies, exacerbated by insufficient training, financial constraints, and systemic problems, greatly reduce the efficacy of infection prevention methods. The findings demonstrate widespread misconceptions about protective methods, such as the false idea that surgical masks provide adequate protection against tuberculosis transmission. This discrepancy between knowledge and practice highlights the critical need for evidence-based educational interventions to improve nurses' awareness of tuberculosis control strategies. Institutions must transform their systems to meet infection control criteria. This transformation requires efficient resource allocation, ongoing in-service training, continuous compliance monitoring, and the implementation of supportive policies. Addressing these systemic issues is critical not only for protecting healthcare workers but also for lowering tuberculosis transmission rates within healthcare institutions. Future studies should explore mobile learning and interdisciplinary approaches to enhance tuberculosis infection prevention. Finally, investing in nursing education, ongoing professional development, and strong infection control measures are critical for maintaining long-term progress in global tuberculosis prevention efforts.

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CONFLICTS OF INTEREST

There was no conflict of interest, and the research proceeded smoothly to the finish.

REFERENCES

Khalid, N., Zulkepli, N. N., & Islam, D. M. Z. (2020). COVID-19 story the unknown killer and future studies. *... Issue Covid-19*, *1*, 1–18. https://www.academia.edu/download/63196037/1IJMSATco1920200504-79705-aov6dn.pdf.

(1999), D. W. (1999). *Biostatistics: A Foundation for analysis in the Health Sciences.7th edition. New York: John and Sons.* 4–5.

Al-Ahmari, A. M., Alkhaldi, Y. M., & Al-Asmari, B. A. (2021). knowledge, attitude and practice about infection control among primary care professionals in Abha City, kingdom of Saudi Arabia. *Journal of Family Medicine and Primary Care*, *10*(2), 662–668. https://doi.org/10.4103/jfmpc.jfmpc_1278_20.

Apriani, L., McAllister, S., Sharples, K., Nurhasanah, H., Aini, I. N., Susilawati, N., Ruslami, R., Alisjahbana, B., Menzies, D., & Hill, P. C. (2022). Tuberculosis infection control measures and knowledge in primary health centres in Bandung, Indonesia. *Journal of Infection Prevention*, *23*(2), 49–58. https://doi.org/10.1177/17571774211046880.

Azeredo, A. C. V., Holler, S. R., de Almeida, E. G. C., Cionek, O. A. G. D., Loureiro, M. M., Freitas, A. A., Anton, C., Machado, F. D., Filho, F. F. D., & Silva, D. R. (2020). Tuberculosis in Health Care Workers and the Impact of Implementation of Hospital Infection-Control Measures. *Workplace Health and Safety*, *68*(11), 519–525. https://doi.org/10.1177/2165079920919133.

Baral, M. A., & Koirala, S. (2022a). Knowledge and Practice on Prevention and Control of Tuberculosis Among Nurses Working in a Regional Hospital, Nepal. *Frontiers in Medicine*, *8*. https://doi.org/10.3389/fmed.2021.788833.

Baral, M. A., & Koirala, S. (2022b). Knowledge and Practice on Prevention and Control of

Tuberculosis Among Nurses Working in a Regional Hospital, Nepal. *Frontiers in Medicine*, *8*. https://doi.org/10.3389/fmed.2021.788833.

Ebere Emilia, A., Aheebwa, A., Joseph Obiezu, E., Jennifer, E., Abdulmuminu, I., Narayana, G., & Chinwe Victoria, U. (2024). KNOWLEDGE AND PREDICTORS OF IMPLEMENTATION OF STANDARD PRECAUTIONS FOR INFECTION PREVENTION AND CONTROL AMONG HEALTH CARE PRACTITIONERS. *J. Infect. Dis*, *18*(2S), 22–33. https://doi.org/10.21010/Ajidv18i2S.5.

Eronen, R., Helle, L., Palonen, T., & Boshuizen, H. P. A. (2024). Practical nurse students' misconceptions about infection prevention and control. *Vocations and Learning*, *17*(1), 143–164. https://doi.org/10.1007/s12186-023-09337-8.

Feng, H., Mao, X., Li, M., & Mao, H. (2024). Analysis of characteristic and postexposure practices of occupational blood and body fluid exposures among health care workers in Chinese tertiary hospitals: a retrospective ten-year study. *BMC Infectious Diseases*, *24*(1), 1–6. https://doi.org/10.1186/s12879-024-09118-1.

Gasaba, E., Niciza, J., Muhayimana, D., & Niyongabo, E. (2020). Infection Control Measures among Healthcare Workers: Knowledge, Attitude and Practice. *Open Journal of Nursing*, *10*(11), 1068–1080. https://doi.org/10.4236/ojn.2020.1011076.

Global Tuberculosis Report 2023. (n.d.). Retrieved December 24, 2024, from https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2023?utm_source=chatgpt.com.

Golja, E. A. (2020). The 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. *International Journal of Infection Control*, *16*(3). https://doi.org/10.3396/ijic.v16i3.019.20.

Hassan Khudhur, F., & Majid Abdul-Wahhab, D. (n.d.). *Nurses' Adherence to Infection Control Practices in Emergency Departments*. https://www.sciencedirect.com/science/article/pii/S0196064414001917.

I., T., F.Z., L. C., J., H. N., E., E. L., & F.X., M.-K. (2023). Infection Risk Perception, Reporting and Post-Exposure Management of Occupational Injuries Among Healthcare Workers in District Hospitals (Yaounde, Cameroon). *MedRxiv*. https://www.medrxiv.org/%0Ahttps://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=empp&NEWS=N&AN=2026946486%0Ahttp://eleanor.lib.gla.ac.uk:4550/resserv?sid=OVID:embase&id=pmid:&id=doi:10.1101%2F2023.08.29.23294797&issn=&isbn=&volume=&issue=&spage=&page.

Jaiswal, K. M., Vaishnao, L. S., Dudhgaonkar, S., Raghte, L., Kewalramani, M. S., Jawade, A. S., & Chugh, K. C. (2020). Knowledge, attitude and preventive practices regarding tuberculosis care and control among health care professionals at TB centres: implications for TB control efforts. *International Journal Of Community Medicine And Public Health*, *7*(6), 2318. https://doi.org/10.18203/2394-6040.ijcmph20202492.

Karanja, P. W., Mulaku, M. N., & Ochodo, E. A. (2024). A synthesis of qualitative evidence of barriers and facilitators in implementing guidelines for TB testing in healthcare settings. *Implementation Science Communications*, *5*(1), 1–13. https://doi.org/10.1186/s43058-024-00565-0.

Main, S., Dwihardiani, B., Hidayat, A., Khodijah, S., Greig, J., Chan, G., Parry, A. E., Nababan, B., Billy, I., du Cros, P., & Triasih, R. (2022). Knowledge and attitudes towards TB among healthcare workers in Yogyakarta, Indonesia. *Public Health Action*, *12*(3), 133–140. https://doi.org/10.5588/pha.22.0017.

Marme, G., Kuzma, J., Zimmerman, P. A., Harris, N., & Rutherford, S. (2023). Tuberculosis infection prevention and control in rural Papua New Guinea: an evaluation using the

infection prevention and control assessment framework. *Antimicrobial Resistance and Infection Control*, *12*(1). https://doi.org/10.1186/s13756-023-01237-9.

Marme, G., Kuzma, J., Zimmerman, P. A., Harris, N., & Rutherford, S. (2024). Investigating socio-ecological factors influencing implementation of tuberculosis infection prevention and control in rural Papua New Guinea. *Journal of Public Health (United Kingdom)*, *46*(2), 267–276. https://doi.org/10.1093/pubmed/fdae018.

Meregildo-Rodriguez, E. D., Ortiz-Pizarro, M., Asmat-Rubio, M. G., Rojas-Benites, M. J., & Vásquez-Tirado, G. A. (2024). Prevalence of latent tuberculosis infection (LTBI) in healthcare workers in Latin America and the Caribbean: systematic review and meta-analysis. *Infezioni in Medicina*, *32*(3), 292–311. https://doi.org/10.53854/liim-3203-4.

Min, J., Kim, H. W., Choi, J. Y., Shin, A. Y., Kang, J. Y., Lee, Y., Myong, J. P., Jeong, H., Bae, S., Koo, H. K., Lee, S. S., Park, J. S., Yim, H. W., & Kim, J. S. (2022). Latent Tuberculosis Cascade of Care Among Healthcare Workers: A Nationwide Cohort Analysis in Korea Between 2017 and 2018. *Journal of Korean Medical Science*, *37*(20). https://doi.org/10.3346/jkms.2022.37.e164.

Murshid, H., Shahbuddin, A.-W., Affah Mahamad, U., & Marwan, A. A. (2020). Knowledge, Attitude, Practice and Stigma of Tuberculosis among Healthcare Providers in Hospital Ampang. In *Malaysian Journal of Medicine and Health Sciences* (Vol. 16, Issue SUPP8).

Nazneen, A., Tarannum, S., Chowdhury, K. I. A., Islam, M. T., Hasibul Islam, S. M., Ahmed, S., Banu, S., & Islam, M. S. (2021). Implementation status of national tuberculosis infection control guidelines in Bangladeshi hospitals. *PLoS ONE*, *16*(2 February). https://doi.org/10.1371/journal.pone.0246923.

Olorunfemi, O., Samuel, D., Adebiyi, J. A., Akindipe, A. P., & Tijani, W. A. (2023). Occupation-related airborne diseases: Management and prevention of tuberculosis among nurses working in Ekiti State University Teaching Hospital. *Journal of Integrative Nursing*, *5*(4), 280–285. https://doi.org/10.4103/jin.jin_75_23.

Paleckyte, A., Dissanayake, O., Mpagama, S., Lipman, M. C., & McHugh, T. D. (2021). Reducing the risk of tuberculosis transmission for HCWs in high incidence settings. In *Antimicrobial Resistance and Infection Control* (Vol. 10, Issue 1). BioMed Central Ltd. https://doi.org/10.1186/s13756-021-00975-y.

Sasapu, S., & Kumar, S. P. (2023). *ASSESSMENT OF KNOWLEDGE, ATTITUDES, AND PRACTICES IN INFECTION PREVENTION AND CONTROL AMONG HEALTH-CARE WORKERS AT THE GOVERNMENT TEACHING HOSPITAL, VISAKHAPATNAM*. *16*, 2023. https://doi.org/10.22159/ajpcr.2023v16i5.46874.

Sharma, S. K., Mandal, A., & Mishra, M. (2021). Effectiveness of m-learning on knowledge and attitude of nurses about the prevention and control of MDR TB: A quasi-randomized study. *Indian Journal of Tuberculosis*, *68*(1), 3–8. https://doi.org/10.1016/j.ijtb.2020.10.013.

Shihora, J., Damor, N. C., Parmar, A., Pankaj, N., & Murugan, Y. (2024). Knowledge, Attitudes, and Preventive Practices Regarding Tuberculosis Among Healthcare Workers and Patients in India: A Mixed-Method Study. *Cureus*. https://doi.org/10.7759/cureus.56368.

Tadesse, A. W., Alagaw, A., Kassa, M., & Bekele, M. (2020). Tuberculosis infection control practices and associated factors among healthcare workers in hospitals of Gamo Gofa Zone, Southern Ethiopia, institution-based cross-sectional study. *PLoS ONE*, *15*(9 September). https://doi.org/10.1371/journal.pone.0239159.

Van der Westhuizen, H. M., Dorward, J., Roberts, N., Greenhalgh, T., Ehrlich, R., Butler, C. C., & Tonkin-Crine, S. (2022). Health worker experiences of implementing TB

infection prevention and control: A qualitative evidence synthesis to inform implementation recommendations. *PLOS Global Public Health*, *2*(7), 1–22. https://doi.org/10.1371/journal.pgph.0000292.

Vigenschow, A., Edoa, J. R., Adegbite, B. R., Agbo, P. A., Adegnika, A. A., Alabi, A., Massinga-Loembe, M., & Grobusch, M. P. (2021). Knowledge, attitudes and practices regarding tuberculosis amongst healthcare workers in Moyen-Ogooué Province, Gabon. *BMC Infectious Diseases*, *21*(1). https://doi.org/10.1186/s12879-021-06225-1.

Wangsan, K., Sapbamrer, R., Sirikul, W., Kiratipaisarl, W., Ongprasert, K., Assavanopakun, P., Surawattanasakul, V., Kitro, A., Panumasvivat, J., & Wongcharoen, A. (2025). Knowledge, Attitudes, Practices, and Perceived Usability of Respirators Among Thai Healthcare Personnel During the COVID-19 Pandemic. *Healthcare (Switzerland)*, *13*(10), 1–14. https://doi.org/10.3390/healthcare13101186.

Xiong, C. L., Wang, G. G., & Hanafi, W. U. R. (2023). Financial impact of nosocomial infections on surgical patients in an eastern Chinese hospital: a propensity score matching study. *Journal of Hospital Infection*, *139*, 67–73. https://doi.org/10.1016/j.jhin.2023.05.017.