

Knowledge, Attitude and Practice towards Prevention of Tuberculosis amongst Healthcare Workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar, Cross River State

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ABSTRACT

Despite the availability of tuberculosis (TB) infection control guidelines, research evidence suggests that its implementation seems to be inadequate in many settings including healthcare facilities. This is particularly due to inadequate knowledge and inappropriate attitude of healthcare workers towards TB prevention and control. This study was conducted as an attempt to investigate knowledge, attitude and practice towards prevention of TB among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar, Cross River State. Three (3) research questions were raised and two (2) hypotheses formulated to direct the course of this study. A descriptive cross-sectional survey was used to study a total of 87 healthcare workers selected from the Healthcare Facility using stratified random sampling technique. The instrument for data collection was validated and reliable questionnaire constructed in consonance with the objectives of the study. Data collected were described using frequency counts, simple percentage, mean, and standard deviation, while the study hypotheses were tested using Pearson Product Moment Correlation Coefficient significant at $p < 0.05$. Results of the study revealed that majority of the respondents had adequate knowledge, positive attitude, and fairly good practice towards prevention of TB infection. There is a statistically significant and positive relationship between knowledge of TB, attitude towards prevention of TB; and practice towards prevention of TB among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar ($p < 0.05$). It was therefore recommended that healthcare workers should be trained and re-trained through prompt participation in seminars, workshops, and conferences on TB infection prevention and control as an avenue to improve their knowledge and promote practice towards prevention and control of TB in the Hospital.

Keywords: Tuberculosis, Knowledge, Attitude, Practice, Prevention, Control & Healthcare workers

BACKGROUND TO THE STUDY

Tuberculosis (TB) is a communicable disease caused by the bacillus *Mycobacterium tuberculosis* (Mtb), which is spread by aerosols expelled from people with active TB disease (Dave et al, 2018). The bacteria most often affects the lungs leading to pulmonary TB, and sometimes, it affect other parts of the body such as the circulatory systems, the central nervous system, the lymphatic, the genitourinary and the gastrointestinal, as well as bones, joints and the skin leading to extra pulmonary TB (Kumar, 2017). Pulmonary TB causes symptoms such as persistent cough with sputum and blood at times, chest pain, weakness, weight loss, fever and night sweats. Other less recognized extra-pulmonary infection sites are the skeletal and central nervous systems (Bussi & Gutierrez, 2019).

TB spread from person to person through the air when people with lung TB cough, sneeze or saliva (Wondimu et al, 2021). Evidence shows that about one-third of the world's population infected by *mycobacterium tuberculosis* are asymptomatic and cannot transmit the disease; hence, had latent TB (WHO, 2018). The lifetime risk of developing active TB for the person infected with *mycobacterium tuberculosis* is 10%. However, the risk increased for immune-compromised individuals such as HIV patients, malnourished

individuals, diabetic patients, and tobacco users (CDC, 2014). It is disclosed that without proper treatment up to two-thirds of people with active TB will die (WHO, 2018).

Prior to the corona virus (COVID-19) pandemic, TB was the leading cause of death from a single infectious agent, ranking above HIV/AIDS as indicated by the World Health Organization (WHO) Global tuberculosis report in 2021 (WHO, 2021). As an evidence, a systematic review found that TBI prevalence based on positive tuberculin skin test (TST) results ranged from 14% to 98% (mean 49%) in low- and middle-income countries (LMICs), with higher prevalence seen in higher-burden settings (≥ 300 per 100,000) (Apriani et al, 2019). Others have reported an annual TBI incidence between 0.5% and 14.3% and an incidence of active disease ranging from 69 to 5,780/100,000 (Bausano et al, 2021).

The WHO End TB Strategy sets ambitious goals for achieving TB elimination by 2035. Accordingly, pillars one and two of the End TB Strategy are dependent on a well-resourced, healthy, knowledgeable, supportive and skilled healthcare workforce (WHO, 2015). By definition, healthcare workers according to WHO are all those in the health sector and other sectors, whose main activities are aimed at improving health, including health service providers and health management and support workers (Uden et al, 2017; WHO, 2019). These workers are at an increased risk of contracting TB compared to the general population due to potential exposure to infected patients within their workplace (Nasreen et al, 2018). Risk of HCWs contracting TB is higher in low- and middle-income countries (LMICs), where exposure to infection is more likely and infection control practices may be inconsistent or inadequate (Joshi et al, 2020).

Tuberculosis infection control is a combination of measures aimed at minimizing the risk of TB transmission within populations. These include among others, the implementation of an infection control plan, triaging of presumed TB cases, regular TB screening amongst HCWs and optimizing natural ventilation in the facility (WHO, 2021). In addition, the availability and correct use of particular respirators are an important personal protective measure (Vigenschow et al, 2021). For effective implementation of these TB infection control measures, essential knowledge about TB and appropriate attitude toward its prevention is required among HCWs. They must acquire sufficient knowledge to educate co-workers, TB patients, and the society at large about sufficient ventilation (Zhang et al, 2018).

Some studies have reported that knowledge and attitude of HCWs towards prevention of TB are significant predictors to effective implementation of TB infection prevention and control (WHO, 2018; Frieze et al, 2017). In South Africa Free State Province, Engelbrecht et al (2019) assessed the factors associated with health workers' good TB infection control practices using a cross sectional self-administered survey with a sample of 202 nurses and 34 facility-based healthcare workers. The study revealed good level of knowledge and appropriate attitude among the participants. Further analysis indicated that for every unit increase in attitude, good practices increased proportionately. Thus, participants with good knowledge and appropriate attitude were more likely to have good quality practices compared to participants with poor knowledge and a more negative attitude.

It is on the above premise that the present study was conducted to assess knowledge, attitude and practice towards prevention of TB among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar. This is expected to aid the design of prominent intervention that will enhance HCWs' knowledge and attitude, as well as promote the practice of TB infection prevention and control in the Hospital.

STATEMENT OF PROBLEM

Although the magnitude and degree of severity are different, TB affects every population regardless of geographical location, age, sex, race, profession, or any other variability (McIntosh, 2018). It remains a major cause of mortality and in 2018, it leads to an estimated 1.2 million deaths among HIV-negative and 251,000 deaths among HIV-positive people globally with Africa having the highest TB cases next to South-

East Asia (WHO, 2019). With the increasing incidence of drug resistance and HIV pandemic, TB control efforts have now become even more challenging and this has led to a greater concern towards TB infection prevention and control.

Although good knowledge of TB prevention and control and positive attitude towards TB infection prevention and control measures are significant predictors of adequate practices towards TB infection prevention and control among healthcare workers, there is a dearth of evidence portraying the knowledge, attitude and practices of HCWs towards TB prevention and control in Dr. Lawrence Henshaw's Memorial Hospital in Calabar. This however, presents a gap in existing body of knowledge. Therefore, the present study was conducted as an attempt to bridge this gap as it investigates knowledge, attitude and practice towards prevention and control of TB among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar.

Purpose of the study

The main aim of this study was to assess knowledge, attitude and practice towards prevention and control of Tuberculosis among health care workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar.

Specific objectives

Specifically, the study sought to:

1. Assess knowledge of TB among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar;
2. Examine the attitude of healthcare workers towards prevention and control of TB in Dr. Lawrence Henshaw's Memorial Hospital, Calabar;
3. Determine the level of practice towards prevention and control of TB among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar.

Research questions

1. What is the knowledge of TB among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar?
2. What is the attitude of healthcare workers towards prevention of TB in Dr. Lawrence Henshaw's Memorial Hospital, Calabar?
3. What is the level of practice towards prevention of TB among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar?

Research hypotheses

H_{01} : There is no statistically significant relationship between knowledge and practice towards prevention of TB among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar.

H_{02} : There is no statistically significant relationship between attitude and practice towards prevention of TB among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar.

CONTEXTUAL REVIEWS

Epidemiology of TB among healthcare workers

Healthcare workers' risk of active TB disease is estimated to be two- to three-fold greater than the general population (Tudor et al, 2014). Certain work locations such as inpatient TB facilities, laboratories and

internal medicine and emergency facilities, as well as individuals who fit into various occupational categories such as radiology technicians, patient attendants, nurses, ward attendants, paramedics and clinical officers are all associated with a higher risk of active TB disease (Joshi et al, 2016). Moreover, Costa et al. (2017) added that healthcare workers are in the higher risk group of TB infection due to inadequate ventilation of working spaces and procedures involving contaminated aerosols, which favors transmission from an active disease, in the hospital setting.

Healthcare workers' exposure to TB will increase as the number of patients seeking TB treatment at health facilities increases, concomitant with the re-emergence of TB cases due to a high influx of immigrants from high TB burden countries, increasing number of HIV/AIDS cases, transmission within overcrowded settings and emergence of multi-drug resistant TB (Rafiza et al, 2017). Improper implementation of infection control measures has resulted in the occurrence of nosocomial TB transmission. A healthcare worker who is sitting in proximity to an individual infected with TB has about four times greater the risk of TB infection (Jelip et al, 2014). The risk of TB infection, however, varies widely based on different occupational groups and working conditions (Nassaji & Ghorbani, 2012).

The occurrence of TB cases among healthcare workers for those who came from countries with low, intermediate and high TB incidence accounted for about 67 cases/100,000 persons, 91/100,000 persons and 1,180/100,000 persons, respectively, with an average of 34 (IQR 18–108) with 12,689 (IQR 2,979–57,279) persons-year being infected (Baussano et al, 2017). From another perspective, nosocomial exposure was attributed to the risk of TB disease among healthcare workers with a range of 25 to 5,361 per 100,000 yearly, as reported in a systematic review of healthcare workers in low- and middle-income countries (Joshi et al, 2016). Indeed, exposure to the risks in healthcare settings correlated with the incidence of TB cases among healthcare workers (Baussano et al, 2017).

As for the prevalence of latent tuberculosis infection (LTBI) among healthcare workers (HCWs), on average, the annual risk of incidence among healthcare workers is 54% (range 33%–79%) with a range of 69 to 5,780 per 100,000 (Joshi et al, 2016). As in another study, the occurrence of LTBI among healthcare workers accounted for an average of 23 with 731 persons infected annually (Baussano et al, 2017). However, the reported cases of active TB disease were less well-documented among HCWs, although the estimation of LTBI globally is more than 50% among them (Tudor et al, 14). Additionally, a recent study in Santiago among healthcare workers disclosed that the LTBI prevalence is 15.4%, and, among the healthcare workers, physicians have the highest prevalence (21.8%), followed by nurses (19.6%) (Borotto et al, 2017).

Prevention and control of TB

Tuberculosis (TB) infection control is a combination of measures aimed at minimizing the risk of transmission within a population. The fundamental aspects of this control include early and rapid diagnosis and proper management of TB patients. Various guidelines¹⁻⁴ have recommended a combination of control measures to reduce the transmission of the disease in health care settings to health care workers (HCWs) and patients, many of whom may be immune-compromised. Reports show improved implementation of the recommended controls and fewer outbreaks of TB disease in health care settings suggesting that these controls are effective in reducing and preventing health care-associated transmission of *Mycobacterium tuberculosis* (Institute of Medicine, 2019).

The World Health Organization (WHO) policy on TB infection control recommends four levels of protection: an overarching managerial level, administrative control, environmental control, and personal respiratory protection (WHO, 2019). Similarly, because of the well-known occupational risk to HCWs from TB, the U.S. Centers for Disease Control and Prevention (CDC) have recommended in their guidelines that all healthcare settings should have a TB infection control program. This should be designed to ensure prompt detection, airborne precautions, and treatment of individuals who have suspected or confirmed TB

disease and should be based on a three-level hierarchy of controls, including administrative, environmental, and respiratory protection (Jensen et al, 2015). Of these, the first and most important level is the use of administrative measures to reduce the risk of exposure to people who might have TB disease.

Elimination of TB from the healthcare setting is not always possible, but effective treatment of respiratory TB is equivalent. Substitution is not a relevant approach to preventing transmission of TB. The ideal approach to containing a hazard is to implement a hierarchy of controls: elimination, substitution, engineering controls, administrative controls, and PPE (Canadian Centre for Occupational Health & Safety, 2021).

Engineering control

These are measures built into healthcare facility design to reduce the likelihood of HCW, patient/resident and visitor exposure to viable airborne *M. tuberculosis*. They reduce the number of infectious particles in the air by ventilation, high-efficiency particulate air (HEPA) filtration and/or disinfection using ultraviolet germicidal irradiation (UVGI). It is important that engineering controls be regularly checked to ensure that they meet recommendations (WHO, 2019).

Ventilation

The exchange of indoor air with outdoor air reduces the risk of infection by diluting the concentration of airborne pathogens. Theoretically, the risk of transmission should decrease with increasing fresh-air ventilation. To achieve a balanced ventilation system, the amount of supply air (air mechanically pushed into a room) and the amount of exhaust air (air mechanically pulled from a room) must be set to ensure room conditions are stable. Factors such as infiltration (e.g., space around doors, windows and curtains), doors and conditions of an adjacent room need to be considered when balancing a ventilation system.

Ventilation recommendations for airborne infection isolation rooms and other select areas are of critical importance because of their positive impact on reducing the risk for healthcare-associated transmission of

M. tuberculosis. The supply and exhaust air system need to be properly designed to achieve effective air changes within a space. The location of the supply and exhaust air diffusers, the speed of the air, furniture in the room and other items that affect air flow patterns will affect the effectiveness of the air changes per hour (ACH). Increasing the number of ACH from 1 to 6 will result in more rapid clearing of infectious airborne microorganisms from the room air. However, further increases above 6 ACH will have progressively less effect, and increases above 12 ACH may provide minimal additional benefit (Beggs et al, 2019).

Adequate ventilation in general areas such as inpatient, examination and treatment rooms is important because people with unsuspected respiratory TB may be placed in them, posing a risk of transmission to other patients and HCWs (Hubad & Lapanje, 2012). Ventilation in these areas may be poor and further disrupted by opening and closing doors, installation of ceiling fans post-design and use of items such as ground circulation fans and electric heaters.

Administrative controls

These are institutional policies or measures that 1) aim to reduce the time between the arrival of an individual with undiagnosed respiratory TB at a healthcare facility and making a presumptive diagnosis of their condition, placing the patient on airborne precautions, establishing the diagnosis and starting antimicrobial treatment; 2) provide the HCW with respiratory protection; and 3) evaluate the effectiveness of its IPC strategies and interventions.

The first step of an effective TB IPC Program in every healthcare setting should be to perform an

organizational risk assessment in order to understand what measures are required to decrease the risk of patient/resident/client, visitor and HCW exposure to *M. tuberculosis*. The exposure risk for HCWs engaged in different activities should be evaluated during this assessment (Beggs et al, 2019). Airborne precautions refer to multiple measures applied to prevent airborne exposure to *M. tuberculosis* in the healthcare setting. They include source-control measures, patient accommodation, limiting patient movement and use of respirators, all to reduce the risk of patient-to-patient and patient-to-HCW transmission.

An important component of any TB IPC Program is HCW education on how to recognize and protect them from exposure to *M. tuberculosis*. This includes information on epidemiologic and medical risk factors for TB, signs and symptoms of TB (respiratory and non-respiratory), mechanisms of transmission and principles of control (Boparai et al, 2018).

Personal Protective Equipment

The PPE tier refers to the availability and appropriate use of protective equipment that a susceptible host may wear to provide a physical barrier between them and an infectious agent/infected source. The use of PPE is dependent on HCW adherence and competence and, as a result, is the control that is most easily compromised (Beggs et al, 2019). Respiratory protection of HCWs involves the use of a Health Canada-approved respirator with a filter class equivalent to or higher than an N95, to prevent inhalation of aerosols containing infectious microorganisms. These respirators are certified to filter 95% of particles of diameter 0.3 microns (μm) or larger with less than a 10% leak, thus protecting wearers against airborne infectious microorganisms such as *M. tuberculosis* (CDC, 2018). Medical masks are not designed for respiratory protection of HCWs against *M. tuberculosis*.

Knowledge of TB among healthcare workers

By definition, information that is acquired or gained is considered to be knowledge (Jain et al, 2019). From another perspective, knowledge is defined as what people know about certain subjects (WHO, 2018). Hashim et al. (2018), in a study of knowledge, attitudes and practices, surveyed healthcare workers and TB patients in Iraq. Their responses revealed that 492 (98.4%) out of 500 healthcare workers had a good score for knowledge of TB. TB transmission mode through respiratory tract was correctly answered by 98.2% of the healthcare workers, while 90% said it is treatable, and only 12.6% of them were oblivious that it is caused by a bacterium. The respondents also accurately answered that risk factors of TB are continuous close contact with an active TB patient (83.6%) followed by overcrowding (80.8%), humidity (68.4%) and under-nutrition (67.8%), whilst 87% of them answered that the six months' duration of anti-TB treatment course is necessary, especially to patients of PTB.

In another study of TB among healthcare workers in Vellore District, Tamil Nadu, South India conducted by Wu (2019), 86% of them were knowledgeable about TB disease. In terms of transmission and symptoms of TB, 95% of them correctly said that TB is transmitted via airborne route through coughing and sneezing, while 92% said shaking hands with a TB patient will not spread the TB germs. Also, good nutritional intake is believed by 75% of the healthcare workers to be helpful in preventing TB disease; 21% of them conservatively believe in the power of prayer. In Thailand, 56% of healthcare providers were found to possess a 'good' level of knowledge of TB, while 43.87% had a 'fair' level of knowledge. 71.23% of the providers with good knowledge were well-informed about the nature of the disease (Lertkanokkun et al, 2018).

A study in the Berea District of Lesotho, South Africa on occupational exposure to TB reported that the majority of healthcare workers (86.1%) have a fair score for knowledge (Bhebhe et al, 2021). The majority of them (90.7%) knew that TB is an airborne infectious disease and it is curable (97.7%). TB as a symptom of chronic cough (94.7%) was answered by most of the healthcare workers, followed by night sweats

(84.5%), weight loss (79.1%), and fever (53.5%). In TB investigation, 96.9% of them agreed that the best diagnostic test is by sputum smear, and 99.2% said that treatment should be completed within the duration of six-months. The healthcare workers were also concerned about the BCG vaccination: 58.6% said that it is not preventive towards TB disease (Bhebhe et al, 2021).

Wondimu et al. (2021) assessed knowledge and attitude of tuberculosis infection control in Mizan Tepi University Teaching Hospital, Ethiopia. The study was an institutional-based cross-sectional study conducted among 215 health professionals. A self-administered questionnaire was used for data collection, and data collected were analyzed using descriptive and inferential statistics. The study revealed that a high proportion (94.9%) of participants answered the possibility of pulmonary tuberculosis transmission from patients to health care workers. About 94% of the respondents identified HIV as a major risk factor to develop active TB. Similarly, 96% participants replied that TB organisms most commonly transmitted from person to person through airborne particles. Furthermore, more than half of the respondents (52.5%) knew an inability of surgical masks to protect the health professionals from inhaling mycobacterium tuberculosis containing aerosols. Overall, 70.2% (95%CI: 63.8%, 76.6%) of the respondents had good knowledge of TBIC. The authors recommended that updating the health professionals through different skill-based TBIC training should be considered.

Similarly, Shrestha et al. (2019) conducted another institutional-based cross-sectional study to assess healthcare workers' knowledge, attitudes and practices on tuberculosis infection control in Nepal. A total of 190 HCWs were assessed for the knowledge, attitudes and practices on TB infection control using a structured questionnaire. The study revealed that most of the HCWs were aware of the major symptoms (67.4%) and route of TB transmission (81.6%). However, only half of them (54.7%) could differentiate between TB infection and TB disease. Nine out of ten HCWs stated that use of respirators can prevent TB infection and regarding the IC measures to be implemented in health facilities, 55% of them stated personal respiratory protection followed by environmental controls (47.4%) and administrative controls (14.7%). Mean score of knowledge on TB IC among HCWs was 10.56 ± 4.29 . The result shows that 54% of HCWs scored "good" level of knowledge while 46% of them had "poor" knowledge level. Based on these findings, the authors advised that effective infection control measures including regular skill-based training and/or orientation for all categories of HCWs can improve infection control practices in health facilities.

Attitude towards prevention and control of TB among healthcare workers

Attitude, by meaning, reflects on how people feel about certain subjects or issues (WHO, 2018). It also describes a way of thinking about a situation (Jain et al, 2019). In other views, attitude refers to the tendency to react in a distinctive way to certain situations, to see and interpret events pertaining to certain tendencies or to assemble opinions into an interrelated structure (Martin et al, 2015). Shrestha et al. (2019) conducted an institutional-based cross-sectional study to assess healthcare workers' knowledge, attitudes and practices on tuberculosis infection control in Nepal. A total of 190 HCWs were assessed for the knowledge, attitudes and practices on TB infection control using a structured questionnaire. The study revealed that majority (73.2%) of HCWs had positive attitudes towards TB IC. Almost all HCWs agreed that there is a need for a TB IC guideline in health facilities (99.5%). Almost all of them (98.4%) agreed that they should wear respirators while caring for TB patients. Majority of HCWs (64.7%) were concerned about being infected with TB and nearly one fifth of them agreed that cough hygiene alone has no role in TB IC. The authors observed that despite having appropriate attitude towards TB IC, HCWs' fear for contracting TB is noteworthy. This fear according to them could often be relating to infecting others including family members and the possible financial implications associated after being infected.

Wondimu et al. (2021) assessed knowledge and attitude of tuberculosis infection control in Mizan Tepi University Teaching Hospital, Ethiopia. The study was an institutional-based cross-sectional study conducted among 215 health professionals. A self-administered questionnaire was used for data collection,

and data collected were analyzed using descriptive and inferential statistics. This study revealed that 90.4% of participants agreed with the need for an infection control committee in every health facility for the successful control of TB. A majority (92.5%) of the respondents agreed with the separation of active TB patients from other patients as an effective strategy for preventing transmission of TB. Similarly, a very high proportion (90%) of participants agreed with the need for periodic testing and evaluation of health care workers who are at risk for exposure to TB disease. In general, more than three fourth (78.3%; 95% CI: 72.3%, 84%) of them had positive towards TB IC.

Vigenschow et al. (2021) investigated knowledge, attitudes and practices regarding tuberculosis among healthcare workers in Moyen-Ogooue Province of Gabon. An interviewer-administered knowledge, attitude and practice survey amongst healthcare workers in 20 healthcare facilities at all levels in the Moyen-Ogooué province, Gabon was conducted. A total of 103 questionnaires were completed by various healthcare personnel. The study revealed that Attitudes were generally positive towards tuberculosis infection control efforts. While 84HCWs (81.6%) affirmed that they could get TB themselves, 15 HCWs (14.6%) claimed that they could not be infected. The explanations provided for this assumption were: (1) BCG vaccination (n = 7; 46.7%); (2) lack of exposure due to sufficient precautions (n = 4; 26.7%). The majority (n = 75, 72.8%) was scared of getting TB and named the following reasons (multiple answers were possible): (1) severity of active TB infection (n = 35, 46.7%); (2) risk of infecting a family member (n = 21, 28.0%); and (3) long duration and/or adverse effects of TB treatment (n = 20; 26.7%). Fear of death, social isolation and irreversible damage to the lung were further reasons given by the respondents. Almost all HCWs (n = 97; 94.2%) said that they would keep seeing a friend who was diagnosed with TB; however, 91 (88.3%) would not continue to use the same cutlery, plates and glasses if someone in their family was infected with TB. TB was considered as a stigmatizing disease by 65 HCWs (63.1%). Except for two HCWs, all respondents said that they wished to learn more about TB; and 100 (97.1%) would approve to be screened regularly for TB. Most HCWs (n = 98; 95.1%) considered TB as a major public health problem in Gabon; and 101 (98.1%) saw a need for improvement in regional TB control. The following three measures were the most-frequently suggested ideas to improve general TB control (multiple answers possible): (1) conduction of awareness-raising campaigns (n = 70; 68,0%); (2) intensifying case finding (n = 16; 15.5%); and (3) vaccination programs (n = 10; 9.7%).

In a study done in the Berea District of Lesotho conducted by Bhebhe et al (2019) to assess knowledge, attitude and practices of healthcare workers regarding occupational exposure of pulmonary tuberculosis in South Africa, almost all healthcare workers (93%) were found to have positive attitudes towards TB infection control. The majority of them (97.7%) agreed to complete TB treatment in case of being diagnosed and to improve their eating habits to avoid malnutrition as an approach to TB prevention. Furthermore, 96.1% of them willingly agreed to teach patients and their co-workers about TB prevention, 95.4% are always ready to be screened for TB if needed and 94.6% willingly agreed to attend training related to TB prevention.

Alotaibi et al. (2019) conducted a cross-sectional study to assess tuberculosis knowledge, attitude and practice among healthcare workers during the 2016 Hajj. Using an anonymous self-administered questionnaire, data was collected from a total of 540 HCWs including, physicians, nurses, and other non-administrative HCWs were recruited from 17 countries. The study revealed that the attitude of HCWs towards TB was deemed above average (overall mean attitude score =0.73, SD = 0.15) with 84.7% having above average or higher attitude score (mean attitude score >0.6%). Most HCWs were willing to be educated on TB (95%) and teach others (>85%), willing to be screened for TB if they had suggestive symptoms (94%), would use PPE when dealing with pulmonary TB patients even when it is uncomfortable (82%), would not suspend TB treatment if the patient was feeling better (87%) and trust diagnostic results from laboratory (92%). Also, most would not resign if they were posted to a TB clinic/ward (84%) and they had no issues examining/treating a TB patient (85%). However, some poor attitudes were identified. Nearly 60%

of HCWs were not willing to work in TB clinic/ward, 32% did not think that all TB patients should be isolated and 39% would start TB treatment for a suspected TB case before diagnosis is confirmed if the patient was very ill. While 30% of HCWs thought they had a very low risk of acquiring TB from their patients, 69% were worried about nosocomial acquisition of TB. The authors suggested that HCWs in general had positive attitudes toward working with patients with TB, although some negative attitudes were noted. These were mostly related to willingness to work in TB clinic/ward and to some aspects of management and treatment of TB patients.

Practice towards prevention and control of TB among healthcare workers

World Health Organization defines practice as how people behave (WHO, 2018). It means the reflection and application of rules and knowledge that lead to actions (Jain et al, 2019). Yuet al. (2022), in a study to assess knowledge of attitudes towards and practices associated with pulmonary TB among physicians in St. Luke's Medical Center, Philippines, found that, as TB infection prevention, 39% of doctors opened their windows, whilst 24.4% tried to keep a safe distance, and 12.2% wore masks. Although there was a concern about TB infection, 19.5% out of 38 physicians did not take any necessary preventative approaches while examining TB patients. They expressed that, for TB treatment and its compliance, improved communication with the patients is essential, in addition to always keeping up to date within formation on TB by reading periodicals, attending academic meetings and searching the Internet.

Bhebhe et al. (2019), in their evaluation of occupational exposure to TB among healthcare workers in the Berea District of Lesotho, South Africa, revealed that half of them (52.7%) received a 'fair' score for practice, while only 10.9% received a 'good' practice score on TB prevention. In terms of administrative control measures, the majority of health care workers (93.8%) said that the screening of TB patients for HIV was done on a regular basis, while only 26.4% educated patients on TB infection control. Environment control measures mostly consisted of isolation of patients and ward separation (78.3%) and improving air ventilation and sunlight by opening windows (69%). The healthcare workers also practiced hand hygiene (76%) and the use of a respirator mask (71.3%) for personal protection measures, but only half of them (54.4%) made use of the appropriate respirator, N-95.

In another related study, 90% of the health staff at basic health care facilities in Bavi District in rural Vietnam accurately responded on the correct ways to diagnose suspected TB cases (Hoa et al, 2018). Regarding patients' management measure during TB treatment course, the practice was reported low (22.1%). However, the majority of the staff (89.7%) responded appropriately to questions about dealing with TB patients with symptoms of coughing and weight loss. Although during treatment course the reported practice was lower, among staff members who had attended a TB training course, it was higher (28). Additionally, Nicol et al. (2017) revealed that TB training for healthcare workers could reduce the likelihood of TB infection and that there was a correlation between training attendance and low TST positivity test incidence. Training is considered to be one of the related factors that influence healthcare workers regardless of cultural and ethnic background, practice settings, preferred sources of information and learning styles (Nicol et al, 2019).

Alotaibi et al. (2019) conducted a cross-sectional study to assess tuberculosis knowledge, attitude and practice among healthcare workers during the 2016 Hajj. Using an anonymous self-administered questionnaire, data was collected from a total of 540 HCWs including, physicians, nurses, and other non-administrative HCWs were recruited from 17 countries. The study revealed that HCWs reported good practice regarding TB management and infection prevention (overall mean practice score = 0.81, SD = 0.17). Most reported performing hand hygiene, using appropriate PPE when dealing with PTB patients or handling TB samples (>83%), not using soiled N95 respirators (88%), isolating TB cases from other patients (92%), and separating TB patients from those with HIV (91%). Over 90% of HCWs reported requesting sputum tests when they suspect active TB and ensuring the samples' quality. Also, 74% order

HIV test when a patient is diagnosed with TB and 90% request liver function tests before starting anti-TB treatment. In addition, 88% of HCWs reported requesting contact tracing for all confirmed TB cases and 79% start those contacts who are positive for IGRA/TST on isoniazid/rifampicin prophylaxis. Poor practice was reported for commencing anti-TB treatment on suspected TB cases before laboratory confirmation (33.5%) and not opening the windows in TB patients' rooms to increase natural ventilation (51%). The authors concluded that though the results were encouraging, important knowledge gaps and some poor attitudes and practices regarding TB were identified among HCWs during Hajj. This calls for multifaceted interventions to improve HCWs KAP regarding TB including tailored, periodic TB education and training aimed at boosting knowledge and improving behavior.

RESEARCH METHODOLOGY

Research design

This study adopts a cross-sectional descriptive survey design. The survey design particularly aimed at describing the nature of a situation that exists at the time of the study. It gives a precise representation of the characteristic of persons, phenomena, situation, population or groups and/or the rate with which certain occurrence takes place. Ndiyo (2010) describes the survey design as a study design that involves selecting and studying of samples derived from populations of interest to ascertain the relative occurrence, distribution and interrelations of variables of sociological and psychological relevance. He stressed that survey design typically made use of questionnaires and interviews to elicit opinions, attitude, preferences, and perceptions of individuals of specific interest to the researcher. With these assertions, it is obvious that survey design is aimed at eliciting information on specific facts regarding the entire population of a study from a representative sample of this population, and through a questionnaire and/or interview. Hence, this design is adopted for this study to facilitate the investigation on knowledge, attitude and practice towards prevention of tuberculosis among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar, Cross River State.

Area of Study

The area of study or research setting is Dr Lawrence Henshaw's Memorial Hospital. It was founded in 1905 by first Colonial Masters as Infectious Disease Hospital and renamed after Dr Lawrence in 2020. It is situated at number 5 New Edgerly Street, Ward 7 Calabar South Local Government Area, Nigeria. It operates 24 hours under License as both specialist Hospital and a Research Centre by State Ministry of Health with Facility Code of 09/09/1/1/1/0092. It serves at the second tier of healthcare service as both Primary, Secondary/Specialist care providers (General Hospital).

It possesses 46 bed space offering broad range of medical services like Cardiology, Gastro-enterology, Pulmonology, Infectious Disease, and Family Medicine. It provides special clinical services like HIV/ AIDS Services, Tuberculosis, Non-Communicable Diseases, Family Planning and Hepatitis. It has onsite laboratory and Pharmacy to attend to clients even from other health facilities. Her most popular use is provision of standard mortuary services to every client with functional ambulance to deliver the death remains at cemetery in line with family request.

At Primary Healthcare services, Dr Lawrence Henshaw's Memorial Hospital is the first point of call of most patient's complaint. Care givers at this level are Nurses, Community Health Workers and Medical Doctors who practices general medicine.

Population of Study

The population of study or target population consists of all Healthcare workers working in Dr. Lawrence

Henshaw's Memorial Hospital, Calabar. These include; 15 Doctors, 32 Nurses, 6 Pharmacists, 9 Laboratory Scientists, and 49 Health Assistants, giving a total of 111 healthcare workers.

Sample and sampling technique

The sample size for the study consists of 87 Healthcare workers working in Dr. Lawrence Henshaw's Memorial Hospital, Calabar. This sample size was obtained using Taro Yemem formula for sample size determination.

The sampling technique adopted for the study was the stratified random sampling. Each cadre of healthcare workers was considered as a stratum of the study population. They include: Doctors, Nurses, Health Assistants, Laboratory Scientists, and Pharmacists. Since each cadre of healthcare workers has its population size, the sample size was proportionately allocated to each cadre using proportional sampling technique. The study participants were selected using convenient sampling technique. This is a non-probability sampling method that involves the selection of sample from that part of a population that is close to hand or readily available to the researcher. It is also known as grab sampling or availability sampling. The convenience sampling is not predicated upon any sampling criteria except that subjects be available and willing to participate in the study. Hence, the researcher conveniently recruited healthcare workers in the Hospital who were available as at the time the study was conducted, and were also willing to take part in the study.

Instrument for data collection

A structured instrument titled "Questionnaires on Knowledge, Attitude and Practice Towards Prevention of Tuberculosis among Healthcare Workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar" was developed by the researcher for data collection. The questionnaire consists of four (4) sections, A-D. Section A elicit information regarding the respondents' demographic characteristics; while sections B-F obtained information based on the study variables including; knowledge of tuberculosis, attitude towards prevention of tuberculosis, and practice towards prevention of tuberculosis, among healthcare workers. Section B which was on knowledge was structured using 'yes and 'no' options; while sections C and D were structured using four points Likert scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD).

Validity and reliability of instrument

Validity of a research instrument refers to the extent to which the instrument measures what it is designed to measure. In this study, face validity was established. Hence, the questionnaire was presented to the supervisor and an expert in Test and Measurement to evaluate the relevance of the content and clarity of the statements. The necessary suggestions from the validators were effected by the researcher before using the instrument for data collection.

A pilot survey was conducted for the reliability of the instrument by pre-testing nine (9) copies of the questionnaire that served as an interview schedule in University of Calabar Teaching Hospital, Calabar. The data obtained from the copies of the structured interview schedule were subjected to test-retest reliability procedure. Data collected in the first and second tests were coded, scored and analyzed using Pearson Correlation Coefficient. A reliability coefficient of the range 0.785 to 0.915 was obtained showing that the instrument is reliable and could adequately measure the variables under study.

Pilot study

A pilot study was carried out among healthcare workers in UCTH, Calabar to test the reliability and validity

of the instrument for data collection. The result from the pre-testing was not included in the study as it was used in better understanding the research instrument as well as the flow and time used to complete each questionnaire.

Method of data collection

The questionnaire which served as an interview guide was used to obtain information from the respondents. Two research assistants were trained and used for data collection. These research assistants were nurses working in the study area. They were trained on the purpose of the study and the interpretation of the questions in the interview guide to facilitate easy and objective collection of data from the respondents. Data collection was done on daily bases for a period of two weeks covering all work shifts per day. The interview was conducted on one to one basis, that is, individually. This was to ensure that the respondents were interviewed properly and calmly. A total of 87 copies of interview guide which was the sample size for the study were distributed, and same were properly filled and returned to research at the spot giving a response rate of 100%.

Method of data analysis

Item by item descriptive analyses of the data was carried out to show response frequency and percentage including mean and standard deviation using SPSS version 20. The hypotheses were Pearson product moment correlation coefficient analysis. The statistical significance for all statistical tests was set at $p < 0.05$.

Ethical consideration

For the success of this research work, some ethical issues were considered. A letter of introduction was obtained from the Head of Department of Nursing Science, National Open, Calabar study Centre and submitted to the Chief Medical Director of Dr. Lawrence Henshaw’s Memorial Hospital, Calabar, to obtain permission for the study. Confidentiality was assured to the study’s participants and same was maintained as names were not required. The participants were assured of respect of their freedom of choice and that they will not be prejudiced in any way if they choose not to participate in the study. Also, Authors of books and journals used were properly referenced according to the recommended standard for this research work.

Presentation and analysis of demographic data

Table 3: Percentage distribution of respondents by gender (n = 87)

S/No	Gender	Frequency	Percentage (%)
1.	Male	31	35.6
2.	Female	56	64.6
	Total	87	100

Source: Questionnaire

Table 3 above shows that out of the 87 health workers used for this study, majority 56 (64.6%) were female, while the remaining proportion 31 (35.6%) were male.

Table 4: Percentage distribution of respondents by age (n = 87)

S/No	Age (years)	Frequency	Percentage (%)
1.	≤ 20	4	4.6
2.	21 – 30	14	16.1

3.	31 – 40	30	34.5
4.	41 – 50	24	27.6
5.	> 50	15	17.2
	Total	87	100

Source: Questionnaire

Table 4 above presents the respondents by age. According to the Table, 4 (4.6%) out of the 87 respondents were less but not more than 20 years of age, while the remaining proportion were 21-30 years 14 (16.1%), 31 – 40 years 30 (34.5%), 41 – 50 years 24 (27.6%), and more than 50 years of age 15 (17.2%).

Table 5: Percentage distribution of respondents by marital status (n = 87)

S/No	Marital status	Frequency	Percentage (%)
1.	Single	24	27.6
2.	Married	38	43.6
3.	Separated	6	6.9
4.	Divorced	8	9.2
5.	Widow	11	12.6
	Total	87	100

Source: Questionnaire

Table 5 shows that out of the 87 respondents used for the study, 24 (27.6%) were single, while 38 (43.6%) were married, 6 (6.9%) were separated, 8 (9.2%) were divorced, and 11 (12.6%) were widow and/or widower.

Table 6: Percentage distribution of respondents by religion (n = 87)

S/No	Religion	Frequency	Percentage (%)
1.	Muslim	4	4.6
2.	Christianity	83	95.4
3.	Traditional	–	0.0
4.	Others	–	0.0
	Total	87	100

Source: Questionnaire

The above Table reveals that among the 87 respondents used for this study, 4 (4.6%) were Muslims, while 83 (95.4%) were Christians, and none of them was a traditional worshipper or had any other form of worship respectively.

Table 7: Percentage distribution of respondents by highest academic qualification (n = 87)

S/No	Highest academic qualification	Frequency	Percentage (%)
1.	FSLC	–	0.0
2.	SSC	24	27.6

3.	Diploma	7	8.0
4.	Bachelor's Degree	40	46.0
5.	Masters' Degree	13	14.9
6.	Doctorate Degree	3	3.5
	Total	87	100

Source: Questionnaire

Table 7 shows that out of the 87 respondents, none had First School Leaving Certificate as his/her highest academic qualification, 24 (27.6%) had Senior School Certificate their highest academic qualification, while 7 (8.0%) had diploma, 40 (46.0%) had Bachelor's Degree, 13 (14.9%) had Masters' Degree, and 3 (3.5%) had Doctorate Degree, as their highest academic qualification.

Table 8: Percentage distribution of respondents by cadre (n = 87)

S/No	Cadre	Frequency	Percentage (%)
1.	Doctor	12	13.8
2.	Nurses	25	28.7
3.	Laboratory Scientists	7	8.0
4.	Pharmacist	5	5.7
5.	Health Assistant	38	43.7
	Total	87	100

Source: Questionnaire

Table 8 above shows that 12 (13.8%) out of the 87 respondents were Doctors, 25 (28.7%) were Nurses, 7 (8.0%) were Laboratory Technicians, while 5 (5.7%) were Pharmacists, and 38 (43.7%) were Health Assistants.

Table 9: Percentage distribution of respondents by years of work experience (n = 87)

S/No	Years in service	Frequency	Percentage (%)
1.	≤ 5 years	11	12.6
2.	6 – 10 years	21	24.1
3.	11 – 15 years	19	21.8
4.	16 – 20 years	13	14.9
5.	21 – 25 years	15	17.2
6.	26 years & above	8	9.2
	Total	87	100

Source: Questionnaire

Table 9 shows that among the 87 respondents, 11 (12.6%) had worked in the Hospital for less than but not more than 5 years prior to the study, 21 (24.1%) had worked for 6 – 10 years, 19 (21.8%) had worked for 11-15 years, while 13 (14.9%) had worked in the Hospital for 16 – 20 years, 15 (17.2%) had worked for 21-25 years, and 8 (9.2%) had worked in the Hospital for 26 years and above.

Analysis of research question

Research question 1: What is the knowledge of TB among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar?

This question was raised to assess the knowledge on the concept of tuberculosis among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar. To answer this question, items under section B of the questionnaire were analyzed and results presented in Table 4.8 below.

Table 4.8: Knowledge of TB among the respondents (n = 87)

S/n	Variable	Frequency	Percentage (%)
1.	TB is an infectious disease		
	Yes	85	97.7
	No	2	2.3
	Total	87	100
2.	TB is a curable disease.		
	Yes	79	90.8
	No	8	9.2
	Total	87	100
3.	TB often spread from one person to another through blood.		
	Yes	5	5.7
	No	82	94.3
	Total	87	100
4.	Usually, only people with active TB disease in the lungs or throat are infectious		
	Yes	69	79.3
	No	18	20.7
	Total	87	100
5.	Do all people infected by TB develop symptoms and TB disease?		
	Yes	36	41.4
	No	51	58.6
	Total	87	100
6.	Coughing is the most common symptom of pulmonary TB.		
	Yes	81	93.1
	No	6	6.9
	Total	87	100
7.	Is a N95 mask 100% protective against TB?		
	Yes	43	49.4
	No	44	50.6
	Total	87	100
8.	A person who is infected with TB can be prevented from becoming sick with TB by undergoing TB preventive therapy.		
	Yes	59	67.8

	No	28	32.2
	Total	87	100
9.	Keeping doors and windows open helps reduce the spread of TB.		
	Yes	72	82.8
	No	15	17.2
	Total	87	100
10.	Healthcare staff are more at risk of contracting TB than the general community.		
	Yes	78	89.7
	No	9	10.3
	Total	87	100

Source: Questionnaire

Table 4.8 presents the respondents’ knowledge on tuberculosis. The Table shows that nearly all 85 (97.7%) the study participants knew that TB is an infectious disease; majority 79 (90.8%) responded ‘yes’ that TB is a curable disease, while majority 82 (94.3%) disagreed that TB often spread from one person to another through blood. Most 69 (79.3%) of the respondents answered ‘yes’ that only people with active TB disease in the lungs or throat are usually infectious; slightly more than half 51 (58.6%) of the respondents disagreed that all people infected by TB do develop symptoms and TB disease; majority 81 (93.1%) affirmed that coughing is the most common symptom of pulmonary TB; about half 44 (50.6%) of the respondents disagreed that a N95 mask offers 100% protection against TB; many 59 (67.8%) respondents in their opinion affirmed that a person who is infected with TB can be prevented from becoming sick with TB by undergoing TB preventive therapy; while majority 72 (82.8%) answered ‘yes’ that keeping doors and windows open helps reduce the spread of TB; and majority 78 (89.7%) of the respondents responded in the affirmative that health care staff are more at risk of contracting TB than the general community. These findings are summarized in Table 4.9 below.

Table 4.9: Summary of respondents’ knowledge of TB (n = 87)

Knowledge	No. of respondents	Percentage (%)	Range (scores)	Mean ()	Standard Deviation (SD)
Adequate	67	77.0	6 – 10	9.69	0.75
Inadequate	20	23.0	0 – 5	4.07	0.52
Total	87	100	0 – 10	8.99	1.31

Source: Table 4.8

Table 4.9 presents a summary of the respondents’ knowledge of TB. According to the Table, majority 67 (77.0%) of the study participants had adequate knowledge of TB with a mean knowledge score of 9.69 (0.75), while the remaining proportion 20 (23.0%) had inadequate knowledge of TB with a mean knowledge score of 4.07 (0.52). The mean knowledge score of 8.99 (1.31) obtain for all the 87 participants falls within the score range of adequate knowledge. Therefore, it is inferred that healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar possess adequate knowledge of TB.

Research question 2: What is the attitude of healthcare workers towards prevention of TB in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar?

The research question 2 was raised to examine the attitude of healthcare workers towards prevention of tuberculosis in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar. To answer this question, items under

section C of the questionnaire were analyzed and results presented in Table 4.10 below.

Table 4.10: Attitude towards prevention of TB among the respondents (n = 87)

S/No.	Variable	Frequency	Percentage (%)
1.	It is very important to prevent the spread of TB in the Hospital.		
	Strongly agree	72	82.8
	Agree	11	12.6
	Disagree	2	2.3
	Strongly disagree	2	2.3
	Total	87	100
2.	It is important for the Hospital to have an official TB infection control policy.		
	Strongly agree	66	75.9
	Agree	19	21.8
	Disagree	2	2.3
	Strongly disagree	–	0.0
	Total	87	100
3.	Training of healthcare workers on prevention and control of TB is of necessity.		
	Strongly agree	80	92.0
	Agree	7	8.0
	Disagree	–	0.0
	Strongly disagree	–	0.0
	Total	87	100
4.	I would feel comfortable requesting TB diagnosis If I were to develop symptoms of TB.		
	Strongly agree	41	47.1
	Agree	29	33.3
	Disagree	13	14.9
	Strongly disagree	4	4.6
	Total	87	100
5.	Using face mask while with TB patients use to be so uncomfortable.		
	Strongly agree	3	3.4
	Agree	15	17.2
	Disagree	47	54.0
	Strongly disagree	22	25.3
	Total	87	100

Source: Questionnaire

Table 4.10 presents the respondents' attitude towards prevention of TB. The Table shows that majority 72 (82.8%) of the 87 respondents agreed strongly that it is very important to prevent the spread of TB in the

Hospital; majority 66 (75.9%) also agreed strongly that it is important for the Hospital to have an official TB infection control policy; while majority 80 (92.0%) strongly agreed that training of healthcare workers on prevention and control of TB is a necessity; a greater proportion 41 (47.1%) agreed strongly that they would feel comfortable requesting TB diagnosis if they were to develop symptoms of TB; and slightly more than half 47 (54.0%) of the participants disagreed that using face mask while with TB patients use to be so uncomfortable. These findings are summarized in Table 4.11 below.

Table 4.11: Summary of respondents’ attitude towards prevention of TB (n = 87)

Attitude	No. of respondents	Percentage (%)	Range (scores)	Mean ()	Standard Deviation (SD)
Positive	61	70.1	14 – 20	18.44	2.81
Negative	26	29.9	6 – 13	11.70	2.59
Total	87	100	5 – 20	16.58	3.06

Source: Table 4.10

Table 4.11 summarizes findings as presented in table 4.10. The Table shows that majority 61 (70.1%) of the 87 participants showed positive attitude towards prevention of TB with an attitude mean score of 18.44 (2.81), while the remaining proportion 26 (29.9%) showed negative attitude towards prevention of TB with an attitude mean score of 11.70 (2.59). On the whole, an attitude mean score of 16.58 (3.06) obtain for all the participants indicates an overall positive attitude of the respondents towards prevention of TB. Hence, it is concluded that Healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar possess positive attitude towards prevention of TB.

Research question 3

What is the level of practice towards prevention of TB among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar?

This research question was raised to determine practices towards prevention of tuberculosis among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar. To answer this question, items under section D of the questionnaire were analyzed and results presented in Table 4.12 below.

Table 4.12: Practice towards prevention of TB among the respondents (n = 87)

S/No.	Variable	Frequency	Percentage (%)
1.	I usually perform hand hygiene and wear PPE before and after contact with TB patients/samples.		
	Always	28	32.2
	Sometimes	46	52.9
	Rarely	10	11.5
	Never	2	2.3
	Total	87	100
2.	I usually wear N95 respirator when caring for patient with PTB and/or while working TB samples		
	Always	16	18.4
	Sometimes	34	39.1
	Rarely	21	24.1

	Never	16	18.4
	Total	87	100
3.	I put patients with active TB in isolated rooms.		
	Always	52	59.8
	Sometimes	33	37.9
	Rarely	2	2.3
	Never	–	0.0
	Total	87	100
4.	I open windows when possible in TB patients’ rooms to increase natural ventilation.		
	Always	68	78.2
	Sometimes	18	20.7
	Rarely	1	1.1
	Never	–	0.0
	Total	87	100
5.	I attend seminars on TB infection prevention and control.		
	Always	23	26.4
	Sometimes	39	44.8
	Rarely	20	23.0
	Never	5	5.8
	Total	87	100

Source: Questionnaire

Table 4.12 presents the respondents’ practices towards prevention of TB in the Hospital. The Table shows that slightly more than half 46 (52.9%) of the 87 participants sometimes perform hand hygiene and wear PPE before and after contact with TB patients/samples; a greater proportion 34 (39.1%) of the respondents sometimes wear N95 respirator when caring for patients with PTB and/or while working with TB samples; a little more than half 52 (59.8%) of the respondents always put patients with active TB in isolated rooms; while most 68 (78.2%) respondents always open windows when possible in TB patients’ rooms to increase natural ventilation; and a greater part 39 (44.8%) of the respondents sometimes attend seminars on TB infection prevention and control. These findings are summarized in Table 4.13 below.

Table 4.13: Summary of respondents’ practice towards prevention of TB (n = 87)

Practice	No. of respondents	Percentage (%)	Range (scores)	Mean ()	Standard Deviation (SD)
Good	62	71.3	8 – 15	13.11	2.92
Poor	25	28.7	0 – 7	5.83	2.05
Total	87	100	0 – 15	10.47	3.73

Source: Table 4.12

The above Table shows that out of the 87 healthcare workers who participated in the study, majority 62 (71.3%) had good practices towards prevention of TB in the Hospital with a practice mean score of 13.11 (2.92), while the remaining proportion 25 (28.7%) had poor practices regarding prevention of TB with a mean practice score of 5.83 (2.05). A mean practice score of 10.47 (3.73) obtained for all the 87 respondents

falls within the score range of good (fairly good) preventive practices. Hence, it is inferred that healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar exhibit good practices towards prevention of TB.

Test of hypotheses

Hypothesis one

H_0 : There is no statistically significant relationship between knowledge and practice towards prevention of tuberculosis among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar.

H_1 : There is a statistically significant relationship between knowledge and practice towards prevention of tuberculosis among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar.

This hypothesis was tested using Pearson product moment correlation coefficient (r) at $p < 0.05$ level of significance. A summary of this analysis is presented in Table 4.14 below.

Table 4.14: Pearson Product Moment Correlation Coefficient (r) computation for the relationship between knowledge and practice towards prevention of TB among the respondents (n = 87)

		Knowledge	Practice
Knowledge	Pearson Correlation	1	.951**
	Sig. (2-tailed)		.000
	N	87	87
Practice	Pearson Correlation	.951**	1
	Sig. (2-tailed)	.000	
	N	87	87
**. Correlation is significant at the 0.05 level (2-tailed).			

Decision

Based on the decision rule which states that if the calculated p-value for the test statistics is less than the significant level, then the null hypothesis (H_0) should be rejected; the above Table shows that the p-value (.000) associated with the computed r-statistics of 0.951 is less than the level of significance (0.05). With this, the null hypothesis is rejected leading to a conclusion that there is a statistically significant relationship between knowledge and practice towards prevention of tuberculosis among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar.

Hypothesis Two

H_{02} : There is no significant relationship between attitude and practice towards prevention of TB among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar.

H_2 : There is a significant relationship between attitude and practice towards prevention of TB among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar.

This hypothesis was tested using Pearson product moment correlation coefficient (r) at 0.05 level of significance. Results of this analysis is summarized in Table 4.15 below.

Table 4.15: Pearson Product Moment Correlation Coefficient (r) computation for the relationship between attitude and practice towards prevention of TB among the respondents (n = 87)

		Attitude	Practice
Attitude	Pearson Correlation	1	.876**
	Sig. (2-tailed)		.000
	N	87	87
Practice	Pearson Correlation	.876**	1
	Sig. (2-tailed)	.000	
	N	87	87
**. Correlation is significant at the 0.05 level (2-tailed).			

Decision

Table 4.15 above shows that the p-value (.000) associated with the computed r-statistics of 0.876 is less than the level of significance (0.05). In consonance with the decision rule, the null hypothesis is rejected leading to a conclusion that there is a statistically significant relationship between attitude and practice towards prevention of tuberculosis among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar.

DISCUSSION OF FINDINGS

The present study was conducted to assess knowledge, attitude and practice towards prevention of TB among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar. Findings of the study are discussed in detail below in line with the objectives of the study.

Knowledge of TB among healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar

Findings of the present study revealed that a greater proportion of the participants possessed adequate knowledge of TB. According to the results, nearly all the participants knew that TB is an infectious disease that is curable. Majority knew the mode of transmission of TB and declined that it could be transmitted through blood. Also, a lot of the study participants knew that it is only those people with active TB disease in the lungs or throats that are infectious, and that it’s not all people infected with TB develops symptoms and the disease; majority knew that coughing is the most common symptom of pulmonary TB; about half of the participants declined that a N95 mask offers 100% protection against TB; slightly more than half knew that a person infected with TB can be prevented from becoming sick with the disease by undergoing TB preventive therapy; majority knew that keeping doors and windows open helps reduce the spread of TB; and majority also knew that healthcare staff are more prone to TB infection than people in the community. The aggregation of these findings revealed that healthcare workers in Dr. Lawrence Henshaw’s Memorial Hospital, Calabar possess adequate knowledge of TB, its symptoms, mode of transmission, as well as its prevention. This finding corroborates with findings of a related study conducted by Hashim et al (2018) among healthcare workers in Iraq. The authors reported that a great majority of the health workers were knowledgeable of TB. They knew the mode of transmission of TB, knew that TB is caused by a bacterium, and that the disease is a treatable disease. This is true for participants of the present study who indicated similar knowledge to that of the healthcare workers in Iraq. Similarly, Wu (2019) reported that healthcare workers in South India were knowledgeable about TB disease in terms of its transmission and symptoms, as well as its prevention. This report is also in line with findings of the present study which concluded that healthcare

workers in Dr. Lawrence Henshaw's Memorial Hospital possess adequate knowledge of TB.

Attitude of healthcare workers towards prevention of TB in Dr. Lawrence Henshaw's Memorial Hospital, Calabar

Findings of the present study indicate that on the overall healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar showed positive attitude towards prevention of TB. According to the study findings, the respondents in their opinion indicated that to prevent the spread of TB in the hospital is very crucial. They saw the necessity of having an official TB infection control policy in the Hospital; and nearly all of them believed that training of healthcare workers on prevention and control of TB is very necessary. In the same vein, most of the participants indicated that they would feel comfortable requesting TB diagnosis if they were to develop symptoms of TB; and most of the participants do not feel uncomfortable using face mask while caring for TB patients. A summary of these findings led to the conclusion that healthcare workers in the Hospital possess an overall positive attitude towards prevention of TB infections. This finding is in consonance with Shrestha et al (2019) who reported that healthcare workers in Nepal possess positive attitude towards TB infection prevention and control. Similarly, Wondimu et al (2021) in another related study conducted among healthcare workers in Ethiopia reported that majority of them possess positive attitude towards prevention and control of TB. This is in line with finding of the present study where majority of the participant possessed positive attitude towards prevention of TB.

Practice towards prevention of TB among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar

Result of the study revealed that majority of the participants showed good preventives practices towards prevention of TB infection. The study revealed that most participants usually perform hand hygiene and wear PPE before and after contact with TB patients and/or specimens. A lot of them sometimes wear N95 respirator when caring for TB patients; majority always put patients with active TB in an isolated room; while majority always open windows when possible in TB patients' room to increase natural ventilation; and a greater percentage of the participants sometimes attend seminars and workshops on TB infection prevention and control. The aggregation of these findings led to the inference that healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar exhibit good (fairly good) practices towards prevention of TB. This finding is in agreement with Bhebhe et al (2019) who reported that healthcare workers in Berea District of Lesotho, South Africa possess fairly good practice regarding TB infection control. According to their report, the participants considered isolation of patients and ward separation, improve ventilation and sunlight by opening windows, practiced hand hygiene, use respirator mask for personal protection measures, but slightly more than half of them used appropriate respirator (N-95). These reports are in consonance with that of the present study.

Implication of the study to nursing

Among the different categories of HCWs, nurses are the closest to patients and spend more time with patients than all other care providers. One of the most important mechanisms of spread of pathogens is via poor infection control practices healthcare givers. This implies that nurses' influence on spread of infections and other diseases is very significant as they are the managers of patients care. However, this study revealed a good knowledge, positive attitude, and a good (fairly) practices towards prevention of TB among the healthcare workers. Despite these findings, therefore, there is need to improve the level of practice regarding prevention of TB among the nurses through adequate participation in continuing professional education such as workshops, seminars etc. on TB infection prevention and control practices. This is expected to boost their knowledge and further improve their practices as knowledge have been found to be a significant predictor of good practices towards TB prevention and control.

Limitations of the study

Major problems that were encountered in this study were the inability to access enough written materials related to the topic of this research. Also, the researcher encountered difficulties in distributing the questionnaires used for the study. Information was not readily given by the respondents, but with determination, perseverance and a high sense of commitment, the researcher overcame these obstacles. This brought about the successful completion of this study.

CONCLUSION

Following the results of this study, it is concluded that there is an overall fairly good practice towards prevention of TB infection among healthcare workers in Dr. Lawrence Henshaw's Memorial Hospital, Calabar. These preventive practices are significantly associated with the knowledge of TB and attitude towards TB prevention, among these healthcare workers. That is, having adequate knowledge of TB, and a positive attitude towards TB prevention, will metamorphosed into good preventive practices regarding TB infection among the healthcare workers.

RECOMMENDATIONS

The following recommendations are made based on the findings of this study;

1. Healthcare workers should be trained and re-trained through prompt participation in seminars, workshops, and conferences among on TB infection prevention and control as an avenue to improve their knowledge and promote practice towards prevention and control of TB in the Hospital.
2. Strict policies on TB prevention and control should be formulated and implemented with strong monitoring system to ensure adequate compliance to the tenets of the formulated policies. This will streamline healthcare workers' attitude towards TB infection prevention and control.
3. Resources required for TB infection prevention and control should be made available and reachable to healthcare workers in the Hospital to ensure timely and effective practices regarding prevention of TB.
4. Further studies should be conducted on larger scales using qualitative methods, as well as observation of actual practices, and resources availability and other possible infrastructural constrains should be considered in designing these studies.

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