INTRODUCTION

Tuberculosis (TB) is a major occupational hazard in low and middle-income countries. Health care workers (HCWs) are frequently exposed to infectious tuberculotic patients and are likely to develop latent tuberculosis infection (LTBI).2 LTBI is a condition in which the body is able to fight the TB bacteria and prevent the development of active TB disease. The bacteria then become inactive but remain alive in the body.3 Most people who have this form of TB never go on to develop active TB.3

Lee et al.4 emphasise that the prevalence of LTBI appears to be higher in HCWs with a high risk of exposure in TB-related departments compared to those with a low risk of exposure. Surveillance for TB disease and LTBI among staff may provide data useful for TB control practices.5

Horsburg6 emphasises the importance of LTBI screening, stating that identification and treatment of LTBI greatly reduces the likelihood of reactivation and has a potential to protect the health of individuals, as well as the public, by reducing the number of potential sources of infection. Similarly, Catanzaro7 points out that tuberculin skin testing (TST), identifying latent cases of TB and treatment of LTBI, decreases morbidity, mortality, and the spread of TB in communities. The WHO8 concurs that screening HCWs for LTBI is one of the essential components of a TB infection control programme.

According to the recommendations for the diagnosis and treatment of LTBI in HCWs in low TB prevalence settings,2 the traditional TSTs can be used to monitor those who are initially tuberculin skin test negative (< 10 mm) with repeat testing at nine monthly intervals to identify conversion to positive (10 mm increase in size). Low sensitivity and generally negative tests in immuno-compromised persons, the need for the test to be read 48 hours after performing it, and the practicalities of testing large numbers of staff, limit its use for identifying HCWs with TB infection. Background infection rates are high in some population groups which renders the test useless as a monitoring tool. This makes any decisions regarding the source of infection difficult. Although the interferon gamma release assay is a good alternative to the TST as it does not require a person to return for reading of the test, similar limitations for its use would apply. Chest X-rays have low sensitivity and specificity for TB infection and cannot be used for monitoring, but may be considered at pre-employment examination as a baseline for comparison, should the HCW subsequently develop symptoms suggestive of TB.

The benefit of identifying infection early lies in reduced risks of progression to active infection in the year following infection, and the consideration for isoniazid (INH) treatment to reduce this progression in the small percentage of persons at risk.

The management of latent tuberculosis infection in health care workers at hospitals in Vhembe district

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ABSTRACT

Tuberculosis is a major occupational hazard in low and middle-income countries. Health care workers (HCWs) are frequently exposed to infectious tuberculotic patients and are likely to develop latent tuberculosis infection (LTBI). This study investigated practices of managing LTBI in HCWs at hospitals in rural Venda. A qualitative approach, using a cross-sectional descriptive phenomenology design was adopted to study 57 focus group participants comprised of various categories of HCWs who were purposively selected from seven hospitals in Vhembe district. LTBI screening by HCWs in these hospitals was not accessible, primarily due to costs. Prophylaxis TB treatment was not given to HCWs exposed to infectious tuberculotic patients. The tests performed to diagnose LTBI in HCWs at these hospitals were those performed to diagnose active TB disease. There is a lack of clear guidelines for the detection of LTBI in HCWs in South Africa, which had led to hospitals in the Vhembe district failing to apply appropriate practices. A call is hereby made to the South African National Department of Health for clarity on practices for the detection of LTBI.

Keywords: latent tuberculosis infection, tuberculin skin test, prophylaxis, tuberculosis screening
However, the situation in South Africa is not clear cut. There is a very high prevalence of TB infection with consequences for TST testing. Singh et al.\(^9\) warns that HCWs’ TST screening is very resource-intensive, and should only be used in a setting where preventive therapy is offered.

**Purpose of the study**

This study is part of a larger study that was conducted to collect baseline information for the development of a model for effective TB nosocomial infection control in rural hospitals of Vhembe district. This part of the study investigated practices of managing LTBI in HCWs at hospitals.

**Objectives**

The objectives of this part of the study were to 1) describe pre-employment or pre-placement LTBI screening practices at hospitals in Vhembe district, in the year 2012; 2) determine what action is taken if HCWs are exposed to infectious tuberculotic patients at these hospitals; 3) describe HCWs’ accessibility to LTBI screening at these hospitals; and 3) describe the type of tests performed to diagnose LTBI in HCWs at these hospitals.

**METHODS**

A qualitative approach was adopted, using a cross-sectional descriptive phenomenology design.\(^10\) Vhembe district has eight public hospitals. One hospital is a psychiatric hospital which does not admit TB patients. This study was therefore conducted at the seven other hospitals. The target population was all the HCWs employed in the seven hospitals. Purposive sampling of a maximum variation type\(^11\) was used to select representative focus group participants believed to have the information needed to answer the research questions. The participants in each focus group discussion varied and comprised nursing deputy managers, laboratory staff members, surgical ward nurses, Antiretroviral Therapy (ARV) clinic nurses, TB focal point staff, paediatric ward nurses, out-patient department (OPD)/casualty nurses, X-ray staff members, TB ward nurses, medical ward nurses, infection control nurses, occupational health and safety (OHS) nurses, pharmacy staff members, sub-acute ward nurses, maternity ward nurses and psychiatric ward nurses. There was one focus group per hospital, each comprising five to 10 members.

The central question for the focus group discussions was: “How would you describe the practices of managing LTBI in HCWs in this hospital?” It was first established that the study participants understood the question, after which, in response to the answers, follow-up and probing questions in the unstructured focus group discussion guide were asked. The content and construct validity of the interview guide and the document study was checked and endorsed by the Vhembe district TB coordinator and then compared with the WHO\(^12\) TB infection control policy. Data collection at the first hospital afforded the researcher an opportunity to pre-test the focus group discussion guide amongst 10 focus group members at a hospital with similar characteristics in another district in order to check the reliability of the tool. Furthermore, an interater test (where the researcher and two research assistants collected data from the same participants and compared the findings) was conducted to determine whether the wording and constructs were clear, as well as to check

“Any nurse who wishes to be screened for TB at this hospital has to take the initiative and is expected to pay for the screening tests. However, if a nurse is found to be sick with TB, he or she is put on TB treatment free of charge.”
Permission to conduct this study was obtained from the School of Health Sciences and University of Venda (UNIVEN) Higher Degree Committees, as well as from the Limpopo Provincial Department of Health. Ethical clearance was obtained from the UNIVEN Ethics Committee. Data were analysed using an open coding method, following Tesch’s\textsuperscript{13} 8-step criteria described by Creswell.\textsuperscript{14} Lincoln and Guba’s\textsuperscript{15} model, comprising four criteria or measures to ensure trustworthiness of the study findings, namely truth value (credibility), applicability (transferability), consistency (dependability) and neutrality (conformability) was adopted. In observance of these criteria, prolonged engagement of focus group participants during data collection provided a relaxed environment for sharing as much information as possible.

RESULTS
The analysis of the qualitative data on the theme management of LTBI in HCWs yielded four sub-themes. The results are organised per sub-theme as follows:

Hospitals did not conduct pre-employment or pre-placement LTBI screening tests such as TSTs and interferon gamma release assays

The American Academy of Family Physicians\textsuperscript{16} advises that, if a HCW is exposed to a patient who has active TB, he/she should have a baseline TST (unless he/she has recently had an annual TB test) and a follow-up test in three months to show if the exposure resulted in infection. In this study, when focus group participants were asked if hospitals conduct pre-employment or pre-placement LTBI screening, the HCWs reported that only three of the seven hospitals conducted pre-employment or pre-placement screening examinations to rule out diseases in general. No hospital conducted TSTs or interferon gamma release assays. According to a paediatric ward nurse from hospital D, “Every nurse, including the general assistants, is screened periodically, free of charge, to rule out all diseases, though I am not sure how often these screenings are done per year”. The remaining four hospitals did not conduct pre-employment or pre-placement screening. A radiographer from hospital G said: “In this hospital, no HCW is screened for TB, either upon employment or periodically”.

HCWs’ screening for LTBI was not accessible due to costs

When a probing question was asked, HCWs answered that screening for LTBI was not accessible due to costs that would be incurred. Only two of the seven hospitals offered HCWs periodic screening, not specific to LTBI, free of charge. According to an ARV clinic nurse from hospital D, “Periodic screening in this hospital is free of charge.” A TB ward nurse from hospital C added, “Periodic screening, not specific to LTBI, is done yearly and is free of charge.” The remaining five hospitals expected their HCWs to pay for pre-employment or pre-placement screening. According to HCWs from hospitals A, B, E, F, and G, “Any nurse who wishes to be screened for TB at this hospital has to take the initiative and is expected to pay for the screening tests. However, if a nurse is found to be sick with TB, he or she is put on TB treatment free of charge.”

Hospitals did not give prophylaxis TB treatment to HCWs exposed to TB infection

Only one of the seven hospitals provided prophylaxis TB treatment, in the form of INH tablets, 270 mg daily for nine months, to HCWs working in close contact with TB patients. According to a TB ward nurse from hospital A, “HCWs who are working in close contact with TB patients are given prophylaxis treatment in the form of INH tablets”. The remaining six hospitals did not provide anything to HCWs working in close contact with TB patients. Focus group participants from hospitals, B, C, D, E, F and G said,
“It is not official that HCWs working in close contact with TB patients should take INH as a prophylaxis treatment. However, HCWs who realise the risk of contracting TB ‘take the treatments unauthorised’.”

Inappropriate tests are used to screen HCWs for LTBI

When a probing question was asked to identify the type of tests performed to diagnose LTBI in HCWs, it was stated that chest X-rays, ESR and FBC screening tests were done. No hospital conducted TSTs or interferon gamma release assays. According to focus group participants from hospital B, C, D, “Employees are offered pre-employment examination, which covers chest X-ray, ESR, FBC and hepatitis, the findings of which serve as baseline data.”

DISCUSSION

The management of LTBI in HCWs was incorrect in most of the seven hospitals in which the focus group participants were employed, and was not aligned to national and international TB standards. Hospitals did not conduct pre-employment or pre-placement LTBI screening, in some cases due to costs. In addition, prophylaxis TB treatment was not given to HCWs exposed to TB infection. The tests performed to diagnose LTBI in HCWs at these hospitals were those used to diagnose active TB disease. Each of these four themes is discussed below.

Hospitals did not conduct pre-employment or pre-placement LTBI screening tests such as TSTs and interferon gamma release assays

In support of these findings, the University Research Co. LLC and the Desmond Tutu Tuberculosis Centre report that only 40% of health care facilities in South Africa have a LTBI screening programme or a written occupational health policy. Furthermore, in 2008, Eshun-Wilson, et al. reported that pre-employment, pre-placement or periodic screenings for LTBI were not done in South Africa. They found that, at Tygerberg Hospital, in Cape Town, South Africa, poor management of LTBI in HCWs was attributed to increased incidences of TB infection. The South African Labour Guide states that the workplace provides a unique opportunity to screen for LTBI, particularly when included as part of an annual health care programme where screening is done once or twice a year, using TST or interferon gamma release assays.

The practice of not conducting pre-employment or pre-placement LTBI screening means that South African health services are not doing enough to create a conducive environment for HCWs, especially with regard to prevention of occupationally-acquired TB. The failure to conduct LTBI screening demonstrates ignorance on the part of employers. In South Africa, pulmonary TB acquired in the workplace, including health care settings, is recognised and classified as an occupational hazard, according to the Department of Labour’s Circular Instruction No. 179 and the Compensation for Occupational Injuries and Diseases Act. According to the Act, workers who are affected by occupational injuries and diseases are entitled to compensation. Thus, HCWs can claim compensation for contracting TB infection at work. Furthermore, the Act states that injuries or diseases caused by the negligence of a worker’s employer may result in increased compensation. The employer would be able to make arguments against lawsuits if pre-employment or pre-placement LTBI screening tests were conducted and results were made available for every employee as proof of the LTBI status of an employee before employment or placement.

HCWs’ screening for LTBI was not accessible due to costs

Zungu and Malotle argue that occupationally-acquired TB has the potential to disrupt the provision of quality health care services by HCWs as a result of absenteeism, decreased morale and, in extreme cases, loss of HCWs. Thus, offering LTBI screening free of charge would improve its accessibility, encouraging many HCWs to undergo such tests, enabling the organisation to record
baseline LTBI data, and making it possible for the organi-
sation to treat those HCWs found to have LTBI and to
be at risk of progressing to an active TB disease state,
thereby preventing service disruption. Expecting HCWs
to pay for their own LTBI screening deters them from
undergoing such tests. The South African Occupational
Health and Safety Act\textsuperscript{23} stipulates that employers should make medical surveillance programmes accessible,
including TSTs for HCWs in high risk areas. HCWs who
are diagnosed with LTBI should be submitted to the office
of the Compensation Commissioner for compensation.\textsuperscript{21}

Costs saved by not providing screening to HCWs could
well be increased if compensation is claimed.

Hospitals do not give prophylaxis TB treatment to HCWs exposed to TB infection

In support of the findings of this study, Eshun-Wilson et
al.\textsuperscript{16} found that prophylaxis TB treatment was not given
to HCWs exposed to TB infection at Tygerberg hospital. Woldehanna and Volmink,\textsuperscript{24} and Akolo et al.\textsuperscript{25} argue
that isoniazid preventive therapy (IPT) reduces the risk
of active TB by approximately 33\% amongst people with
a positive TST. Grant et al.\textsuperscript{26} further claim that IPT was
effective in preventing TB when implemented routinely in
an HIV programme for gold miners in South Africa prior
to ART availability. Charalambous et al.\textsuperscript{27} reported that mortality was lower amongst individuals receiving IPT with
or prior to the start of ART treatment. However, a study on
the effectiveness of IPT amongst the entire workforce of
eight gold mines in South Africa (the Thibela programme)
by Eldred et al.\textsuperscript{28} showed no benefit of IPT in controlling
TB. As a result, the CDC\textsuperscript{29} believes that a combination
regimen of INH and rifapentine (RPT) administered
weekly for 12 weeks as directly observed therapy (DOT)
american on TB rates to the World Health Organization (WHO) and its regulations, and penalisation of employers who fail
to comply with these, by the Department of Labour.


treatment to HCWs exposed to TB infection

In support of the findings of this study, Eshun-Wilson et
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