Occupational health policies and practices related to tuberculosis in health care workers in KwaZulu-Natal, South Africa

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Setting: Three district hospitals in KwaZulu-Natal, South Africa, with specialized drug-resistant tuberculosis (TB) wards.

Objective: To increase understanding of the implementation of occupational health (OH) and infection control (IC) guidelines for the prevention and control of TB among health care workers (HCWs).

Design: An operational cross-sectional study conducted between July and September 2011, consisting of interviews with OH and IC nurses and chart review of OH medical records.

Results: Although general national and provincial OH policies are in place, no specific OH policies exist for hospital settings. Two of three hospitals had a full-time OH nurse and all had a full-time IC nurse. All hospitals offered TB symptom screening; however, only 19% of HCWs were screened in 2010. TB incidence among HCWs was 1958 per 100 000 population in 2010. All hospitals offered HIV counseling and testing; however, only 22% of staff were tested across sites. Two hospitals offered isoniazid preventive therapy to HIV-positive staff and reassigned these staff to low TB risk areas.

Conclusions: While OH policies and procedures are in place, implementation of these policies and procedures is inconsistent. This potentially places HCWs at risk of acquiring TB. These findings support the need for strengthening OH and IC services to prevent TB.

Tuberculosis (TB) is a well-recognized occupational hazard for health care workers (HCWs).¹⁻⁴ More than 50% of HCWs worldwide are estimated to be infected with latent TB, and HCWs are estimated to have a two- to three-fold increased risk of developing TB disease and a five- to six-fold risk of developing drug-resistant TB compared with the general population.³⁻⁶

This risk may be even greater for HCWs in South Africa, where TB incidence is third highest in the world,⁷ and the long-standing human immunodeficiency virus (HIV) epidemic in South Africa places HIV-positive HCWs at an increased risk for developing TB. It is estimated that up to 16% of HCWs in South Africa may be infected with HIV.⁸

South Africa currently has no national occupational health (OH) guidelines for the protection of HCWs.^{9,10} The 1993 Occupational Health and Safety Act No. 85¹¹ lays out general guidelines for the health of all workers in accordance with the Occupational Safety and Health Convention of the International Labour Organization (ILO).¹² Table 1 provides a list of the rec-

ommendations for appropriate measures from international and South African OH and infection control (IC) guidelines. The main recommendations include protecting workers' health through prevention of and protection against hazards, and providing medical services and health education.^{11,12}

The ILO and the South African OHS Act recommend surveillance of workers' health through pre-employment and routine medical screening, especially for workers working in high-risk areas, and exit screening.^{11,12,19} Surveillance of TB among HCWs is important to assess the burden of disease and inform the implementation and effectiveness of IC measures.¹³ The ILO, the Joint United Nations Programme on HIV/AIDS and the World Health Organization (WHO) released joint guidelines on TB-HIV in HCWs that recommend reassigning HIV-positive staff to low-risk areas and providing isoniazid preventive therapy (IPT) to HIV-positive staff.^{13,14}

The occupational health and safety of HCWs is highly dependent on the implementation of effective OH and IC measures and practices. A 2009 WHO review of the South African National Tuberculosis Control Programme documented the need for substantial improvements in OH and safety related to TB IC measures.²⁰ Recent studies assessing TB IC practices in South African hospitals found that HCWs lacked appropriate knowledge and that appropriate IC measures were not being adhered to consistently across all hospitals, placing HCWs at increased risk of repeated exposure and infection.^{21,22}

Little is known about the implementation of OH and TB IC guidelines in South African health care settings. The purpose of this study was to increase our understanding of the implementation of OH and IC guidelines regarding the prevention and control of TB among HCWs in a high TB risk area.

METHODS

An operational cross-sectional study was conducted in the three district general hospitals with specialized multidrug-resistant TB (MDR-TB) wards in KwaZulu-Natal, South Africa, between July and September 2011 as a first step of a larger study to determine occupational risk factors for TB among HCWs. As we were interested in district hospitals with MDR-TB wards on site, we selected these 3 district hospitals from the 42 district hospitals in the province. The hospitals were selected in collaboration with the KwaZulu-Natal Provincial Department of Health (DOH).

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KEY WORDS

tuberculosis; occupational health; infection control; HIV

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TABLE 1 Recommended occupational health and infection control measures from international and South African policies and guidelines, 2010

Recommendation	International			South Africa			KwaZulu-Natal OH and Safety Policy Draft (2003) ¹⁸
	ILO (1981) ¹²	WHO IC guidelines (2009) ¹³	WHO/ILO/ UNAIDS (2011) ¹⁴	OHS Act (1993) ¹¹	COIDA (1993 & 2003) ^{15,16}	IC policy (2007) ¹⁷	
OH representative (Health and Safety Officer)	—	—	—	X	—	—	X
OH practitioner (OH nurse)	X	—	—	X	—	—	—
OH clinic	X	—	—	X	—	—	—
OH and safety committee	—	—	—	X	—	—	X
Wellness services	X	—	—	X	—	—	X
Pre-employment screening for TB	X	—	—	X	—	—	X
Medical surveillance of HCWs (TB screening)	X	X	X	X	—	X	X
Compensation for occupational injuries and disease	—	—	—	X	X	—	X
HIV counseling and testing	*	X	X	*	—	X	*
Personal protective equipment	X	X	X	X	—	Only in DR-TB wards	X
IPT	*	X	X	*	—	—	*
Reassign immune-compromised staff to low-risk areas	*	X	X	*	—	X	*

*Not applicable due to lack of HIV and IPT information at the time.

ILO = International Labour Organization; WHO = World Health Organization; IC = infection control; UNAIDS = Joint United Nations Programme on HIV/AIDS; OHS = Occupational Health and Safety Act; COIDA = Compensation of Occupational Injuries and Diseases Act; OH = occupational health; TB = tuberculosis; HCW = health care worker; HIV = human immunodeficiency virus; DR-TB = drug-resistant TB; IPT = isoniazid preventive therapy.

Study procedure

Three OH and IC nurses were interviewed using respectively 65- and 21-item structured questionnaires on the OH services provided, reported barriers, and implementation of OH and IC guidelines and practices. A chart review of OH employee medical records was also conducted to identify HCWs diagnosed with TB between January 2006 and December 2010. For the purposes of this study, guideline implementation was considered present if national or provincial OH and IC guidelines were operationalized.

The study was approved by the Ethics Committee of the South African Medical Research Council, Cape Town, the KwaZulu-Natal Provincial Health Research Committee, Pietermaritzburg, and the Johns Hopkins Medical Institutions' Institutional Review Board, Baltimore, MD, USA. Letters of approval were received from hospital management at each site.

Statistical analysis

Exploratory analysis was performed using descriptive statistics to calculate frequencies and percentages. Data were collected and managed using REDCap (Research Electronic Data Capture; Vanderbilt University, Nashville, TN, USA) tools hosted at the Johns Hopkins University,²³ and analyzed using Stata version 11 (Stata Corp, College Station, TX, USA).

TABLE 2 Characteristics of three district hospitals in KwaZulu-Natal, South Africa, July–September 2011

	Hospital A	Hospital B	Hospital C
Size of hospital (number of patient beds)	170	280	260
Number of patients admitted for TB, all forms (2010)	205	511	540
Full-time OH nurse	No	Yes	Yes
Full-time IC nurse	Yes	Yes	Yes
OH nurse with postgraduate OH training	No	No	Yes
OH and safety officer	No	No	No

TB = tuberculosis; OH = occupational health; IC = infection control.

RESULTS

The three district hospitals varied in size from 170 to 280 beds, with 332–700 employees ($n = 1682$; Table 2). The mean number of patients admitted for TB (all forms) in 2010 was 418.7 (standard deviation [SD] 185.6). The completeness of employee OH medical records varied across sites. The percentage of available medical records was 85% ($n = 1427$), and ranged from 76% ($n = 251$) to 95% ($n = 617$; Figure).

The three OH nurses interviewed were professional nurses; the average time worked in this capacity was 4.7 years (SD 2.5), ranging from 2 to 7 years (Table 2). Two OH nurses worked full-time in this capacity, while the other worked part-time in OH. One of the three nurses had specific postgraduate OH training, one had received on-the-job training and the third nurse had attended an orientation course.

Figure Study profile of three district hospitals in KwaZulu-Natal, South Africa, July–September 2011. *This number was provided by hospital management at each hospital. †Number of employee medical charts containing usable information.

Guidelines and practices

Two of the three hospitals had implemented the KwaZulu-Natal provincial OH guidelines, and none of the hospitals had a health and safety officer. Two hospitals had health and safety committees, but only one was functioning at the time of this study.

OH services

All three hospitals provided basic OH wellness services, including general wellness, family planning, immunization, HIV post-exposure prophylaxis, HIV counseling and testing (HCT) and TB screening. Pre-placement health screening was routinely performed on new employees; this included a health history, physical health examination, height, weight, glucose screening, urine tests and HCT. Two of the three hospitals asked about previous TB history and screened for TB symptoms. However, no standardized health history forms were used across the sites.

Regular screening for tuberculosis

The OH nurses reported that HCWs working in drug-susceptible TB and general wards were to be screened for TB once a year, while those in MDR-TB wards were to be screened twice a year. Although all three OH nurses stated they performed regular TB screening of HCWs, a small percentage of staff was actually screened. In 2010, the number screened in each hospital out of all staff employed was respectively 1 (0%), 110 (16%) and 202 (31%), or 313 of a total of 1682 (19%; Table 3), and only one case of active TB disease was identified at each hospital. These hospitals nevertheless reported a total of 23 cases in 2010 due to HCWs seeking care from the OH clinic or elsewhere when symptomatic. The incidence of TB among this sample in 2010 was 1958 per 100 000 population, compared with 1142/100 000 among the general population of the province. There were no standardized recommendations regarding whom to screen, how often to screen, and what the screening should include, and there were no standardized screening tools.

TB screening at all three hospitals consisted of monitoring weight, symptoms, and chest X-ray. Two of the three hospitals collected sputum if the HCW was symptomatic and able to produce sputum. Two of three hospitals routinely offered HCT to HCWs at regular TB screening. HCWs diagnosed with TB were referred for treatment to the hospital's out-patient TB clinic, their local primary health care center, the OH clinic or their private provider. Cases of TB among staff were to be reported monthly to the district health and labor offices; however, one hospital did not routinely report cases. All hospitals had some form of tracking for staff cases, but no standardized recording systems were in place.

HIV/AIDS

All hospitals offered HCT; acceptance of HCT ranged from zero in Hospital A to 15% ($n = 103$) in Hospital B to 42% ($n = 274$) in

Hospital C, the one hospital with a trained OH nurse (data not shown). Across the sites, the number of staff known to be HIV-positive by the OH nurses was 178 (11%); however, only 371/1427 (26%) HCWs had their HIV status documented in their medical record. Two of the three hospitals began offering IPT to HIV-positive HCWs in May 2011.

Barriers to implementing or enforcing OH guidelines

When the OH nurses were asked open-ended questions regarding any barriers to implementing or enforcing OH guidelines, two of the three responded that they did not have the authority to implement necessary changes to protect HCWs. One nurse reported that the greatest barrier was the lack of training in OH. In addition, two of the three nurses reported that the absence of a health and safety officer at their hospital made it difficult to investigate safety issues. All of the OH nurses reported being overworked and understaffed and thus unable to screen all HCWs for TB annually. Furthermore, the reluctance of staff to undergo TB screening was another barrier raised.

Barriers to reassigning staff

One of the three OH nurses stated that the entire hospital was considered high-risk, making it difficult to reassign staff. The OH nurses also reported that staff must self-disclose their immune status so the OH nurse can propose reassignment to the management. However, there is no guarantee that immunocompromised staff can be reassigned. Stigma among staff was also raised as an issue. Nurses stated that immunocompromised HCWs do not want to be reassigned to lower-risk areas for fear that co-workers will know that they are immunocompromised. Recognizing that reality, one hospital required HCWs to sign a form stating that they understood the potential risks to their health and that they chose to work in a high-risk area.

Infection control

Given the importance IC plays in the protection of HCWs from developing TB, three IC nurses were also interviewed. All three were professional nurses, had held their positions for ≤ 1 year and were in full-time positions. Two had had on-the-job training, and the third had attended an orientation course lasting several weeks. All three stated that they believed they had the authority to implement changes they thought appropriate to protect HCWs.

All three hospitals had written IC guidelines and a standing active IC committee. Two of the three IC nurses reported performing regular IC risk assessments in the hospital. One hospital reported experiencing problems receiving personal protective equipment (PPE; N95 respirators, gowns, gloves, etc.) and two reported problems with the quality of N95 respirators received, specifically non-approved respirators (sold as N95).

TABLE 3 TB screening among HCWs in three district hospitals in KwaZulu-Natal, South Africa, 2010

	Hospital A <i>n/N (%)</i>	Hospital B <i>n/N (%)</i>	Hospital C <i>n/N (%)</i>	Total <i>n/N (%)</i>
HCWs screened for TB in 2010	1/332 (0)	110/700 (16)	202/650 (31)	313/1682 (19)
HCWs who screened positive for active TB in 2010	1	1	1	3
TB cases among HCWs reported in 2010 ($n = 23$)	5/332 (2)	7/700 (1)	11/650 (2)	23 (1)
TB cases among HCWs between January 2006 and December 2010 ($n = 116$)	25/251 (10)	46/559 (8)	45/617 (7)	116/1427 (8)
HCWs diagnosed with drug-resistant TB between January 2006 and December 2010 ($n = 16$)	0/116 (0)	10/116 (9)	6/116 (5)	16/116 (14)
HCWs diagnosed with TB who were HIV-positive between January 2006 and December 2010 ($n = 24$)*	2/116 (2)	11/116 (9)	11/116 (9)	24/116 (21)

*Where HIV status was recorded in employee medical record.

TB = tuberculosis; HCW = health care worker; HIV = human immunodeficiency virus.

DISCUSSION

This is one of the first studies to specifically examine the implementation of OH and IC guidelines related to preventing TB among HCWs in hospitals. This study demonstrates that while OH services are being offered to HCWs in district hospitals, significant gaps exist in the delivery of these services and in adherence to available recommendations and guidelines. While all three hospitals within this study have an OH clinic and an OH nurse, the services and protection provided across the hospitals varied. A 2002 study of OH services in South Africa found that of the 54 hospitals in KwaZulu-Natal responding to a mailed survey, 64% had a health and safety officer and 93% had a health and safety committee.¹⁰ However, none of the three hospitals evaluated had a health and safety officer at the time of this study, and only one had an active health and safety committee, despite national OH guidelines.¹¹ However, national guidelines are not well enforced in health care settings, as the Department of Labour is charged with enforcing the OHS Act, while OH clinics fall under the responsibility of the DOH.⁹

The availability of employee medical records, levels of TB screening and acceptance of HCT varied across sites, and were highest at the site that had a trained, full-time OH nurse. Although this study did not measure the impact of OH training on screening, this suggests that OH training may lead to greater adherence to screening and prevention recommendations.

The OH nurses reported barriers to carrying out regular active TB screening of staff and assigning immunocompromised staff to low-risk areas per international and national guidelines.^{13,14,24} Stigma regarding TB and HIV remains an issue.^{22,25–27} The fear of stigma and perceived lack of confidentiality may also cause HCWs to be reluctant to inform the OH nurse if they develop TB.²² A trained OH nurse and a health and safety officer could educate and encourage HCWs to be screened for TB and report cases of TB to the OH nurse.

While active screening of TB among HCWs is recommended,^{13,14,17} this study demonstrated that active screening is inadequate, with only 19% of staff being screened in 2010. The majority of cases of TB among staff were identified when symptomatic staff sought care. The surveillance of HCWs for TB is recommended by the WHO for IC programs.¹³ It is necessary for IC and OH services to collaborate to ensure that HCWs receive routine screening for TB and to better protect HCWs and patients. Increasing the proportion of HCWs who receive regular TB symptom screening may improve case finding among this at-risk population and reduce transmission.

All IC nurse positions in this sample were full-time positions. In recent years, emphasis has been placed on the importance of implementing IC measures to prevent TB in hospital settings, and all hospitals had IC guidelines and active IC committees in place.¹³ It is alarming that the hospitals reported problems with receiving PPE, and specifically N95 respirators. A previous study on IC in drug-resistant TB facilities throughout South Africa identified the issue of non-approved respirators (sold as N95) being used.²¹ It is critical to ensure a reliable supply of assured quality N95 respirators as part of a comprehensive IC program. Furthermore, integration of OH and IC services would be ideal.

This study was part of a larger study that included an assessment of IC practices in each ward of each hospital. We found that N95 respirators were regularly available only in TB and MDR-TB wards, and that these wards followed guidelines to maximize natural ventilation by keeping windows and doors open.

Limitations to this study include the small sample size and

limited generalizability to other hospitals in the province or other parts of South Africa, although the hospitals are similar to other district hospitals in the province. The cross-sectional design of this study makes it difficult to determine how services have changed or may change over time. Nonetheless, this is the first operational research study in South Africa with a specific focus on OH practices related to TB prevention.

Only two hospitals had a full-time OH nurse and only one had postgraduate OH training. The quality of OH services and practices were more consistent in the setting with a full-time trained OH nurse, suggesting that OH nurse posts should be dedicated full-time positions filled by staff with postgraduate training in OH. Moreover, while the IC nurses believed they had the authority to implement necessary changes to protect HCWs, OH nurses did not believe they had that authority. More attention and support should be provided to OH services and practices in health care settings to protect HCWs and patients.

Occupational health and IC are intrinsically intertwined, and both are critical for the protection of HCWs in health care settings. Greater integration between the two is warranted to better protect HCWs. The current global shortage of HCWs, especially in sub-Saharan Africa,²⁸ makes it essential to protect HCWs from occupational hazards such as TB. The implementation of OH policies specifically targeted for work in health care settings is urgently needed.

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Contexte : Trois hôpitaux de district au KwaZulu-Natal, Afrique du Sud, comportant des salles spécialisées pour la tuberculose (TB) à germes résistants aux médicaments.

Objectif : Augmenter la compréhension de la mise en œuvre de la santé professionnelle (OH) et des directives de lutte contre l'infection (IC) pour la prévention et la lutte contre la TB parmi les travailleurs de soins de santé (HCW).

Schéma : L'étude opérationnelle transversale conduite entre juillet et septembre 2011 a consisté en interviews d'infirmières d'OH et d'IC et une révision des dossiers médicaux d'OH.

Résultats : Les politiques générales d'OH sont en place au niveau national et provincial ; toutefois, aucune politique d'OH spécifique n'existe pour les contextes hospitaliers. Dans deux des trois hôpitaux, une infirmière d'OH travaille à temps plein, et dans les trois hôpitaux, une

infirmière IC travaille à temps plein. Dans tous les hôpitaux il existe un dépistage des symptômes de la TB. Toutefois 19% seulement des HCW ont fait l'objet d'un dépistage en 2010. L'incidence de la TB parmi les HCW est de 1958/100 000 en 2010. Dans tous les hôpitaux, on offre l'accompagnement et le test pour le virus de l'immuno-déficience humaine (VIH) ; toutefois, dans l'ensemble des sites, 22% seulement du personnel a bénéficié du test. Deux hôpitaux ont offert un traitement préventif à l'isoniazide au personnel séropositif pour le VIH et ont réaffecté ce personnel à des zones à faible risque de TB.

Conclusions : Bien que les politiques et les procédures d'OH soient en place, la mise en œuvre de ces politiques et de ces procédures est incohérente. Ceci entraîne potentiellement un risque de développer une TB chez les HCW. Ces observations sont en faveur de la nécessité du renforcement des services d'OH et d'IC pour la prévention de la TB.

Marco de referencia: Tres hospitales de distrito en KwaZulu-Natal en Suráfrica que cuentan con salas especializadas destinadas a los pacientes con tuberculosis (TB) farmacorresistente.

Objetivo: Conocer mejor la aplicación de las normas de salud ocupacional (OH) y de control de las infecciones (IC) en materia de control de la TB en los profesionales de la salud (HCW).

Métodos: Se llevó a cabo un estudio operativo transversal entre julio y septiembre del 2011 que comportó entrevistas al personal de enfermería dedicado a la OH y al IC y el examen de los expedientes médicos de HCW.

Resultados: Existen políticas generales de OH a escala nacional y provincial, pero se carece de políticas específicas de OH en los entornos hospitalarios. Dos de los tres hospitales contaban con un enfermero de OH a tiempo completo y en todas las instituciones existía un profesional encargado del IC a tiempo completo. Todos los hospitales

proponían la detección sistemática de los síntomas de TB, pero solo el 19% de los HCW había pasado el examen en el 2010. La incidencia de TB en los HCW fue 1958 por 100 000 en el 2010. En todos los hospitales se proponía el diagnóstico y la orientación en materia de infección por el virus de la inmunodeficiencia humana (VIH), pero solo el 22% del personal contaba con una prueba diagnóstica. En dos de los hospitales se suministraba el tratamiento preventivo con isoniazida al personal con un resultado positivo frente al VIH y se reasignaban estas personas a sectores con un bajo riesgo de contraer la TB.

Conclusión: Si bien los hospitales cuentan con procedimientos y políticas vigentes de OH, la aplicación de los mismos es inconstante. La presente situación puede exponer a los HCW al riesgo de contraer la TB. Estos resultados confirman la necesidad de fortalecer los servicios de OH y de IC con el propósito de prevenir la TB.