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Tuberculosis infection control in rural South Africa: survey of knowledge, attitude and practice in hospital staff

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SUMMARY

A baseline assessment of tuberculosis infection control (TB IC) knowledge, attitude and practice (KAP) was conducted among staff in a resource-limited rural South African hospital where nosocomially transmitted multi- and extensively drug-resistant (M/XDR) TB had been reported. Assessment consisted of anonymous questionnaires and direct observation during July–September 2007, soon after the report of M/XDR-TB. Data were obtained from 57 questionnaires and 10 h of direct observation. While knowledge and attitudes were generally supportive of TB IC implementation, 49.1% of staff felt that the hospital did not care about them and/or was not working to prevent staff TB infections, and 42.9% were less willing to continue as a healthcare worker because of staff TB/MDR-TB/XDR-TB deaths. Practices were variable. The recent appointment of an IC officer and implementation of natural ventilation were strengths, but the facility lacked a TB IC policy, the patient TB screening process was inadequate, and 41.5% of respondents were unaware of their personal human immunodeficiency virus (HIV) status. Respondents reported a number of barriers to TB IC implementation such as concerns about the confidentiality of staff health information, the stigma of TB and HIV, inadequate resources, and patient non-compliance. Assessment of staff KAP provided useful data regarding deficits and barriers to TB IC, and helped to focus subsequent IC strategies. Given the critical importance of reducing nosocomial TB transmission, it is recommended that facilities should conduct simplified TB IC assessment, ensure the confidentiality of staff health information, address the stigma of TB/HIV, and implement multi-faceted TB IC facility and behavioural change interventions. Behavioural science methods have the potential to improve TB IC research and implementation.

Introduction

Tuberculosis (TB) is a major threat to global health. In 2008, there were 9.4 million new cases and 1.3 million deaths attributable to this infection.[1] The emerging epidemics of multi- and extensively drug-resistant (M/XDR) TB further imperil patients and public health.[2] With the advent of human immunodeficiency virus (HIV), TB is highly transmissible in resource-limited healthcare facilities.[3] Healthcare workers (HCWs) are at increased risk for acquiring TB in such settings.[4] A recent retrospective chart review in South Africa found far higher rates of M/XDR-TB (diagnosis and admittance) among HCWs compared with the general population, which can lead to severe medical and psychosocial consequences.[5,6]

Experiences at the Church of Scotland Hospital (COSH), a district hospital in rural South Africa, further underscore the dangers of nosocomial transmission to patients and HCWs. A 2006 report from this facility described 53 patients, including four HCWs, infected with rapidly and almost uniformly fatal XDR-TB.[7] Evidence indicated that this infection was likely to have been transmitted nosocomially.[8]

Global TB and HIV experts advocate infection control (IC) as a key TB control strategy.[9] Although TB IC guidelines are available

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for resource-limited settings, their implementation is believed to be inadequate.[10,11] Mathematical modelling studies at COSH have demonstrated that simple and feasible TB IC and other steps in the facility could nearly halve the anticipated number of XDR-TB cases.[12] This assessment was undertaken to characterize TB IC implementation in a resource-limited setting with reported nosocomial M/XDR-TB transmission.

Methods

This cross-sectional baseline audit of staff TB IC knowledge, attitude and practice (KAP) was completed between July and September 2007 at COSH, a 350-bed government district hospital serving an impoverished population in rural KwaZulu-Natal, South Africa. Staff had received no formal training in TB IC, but had been informally instructed by medical staff regarding the use of open windows and respirators (i.e. N95 face masks). The TB case rate in the area is >1000/100,000/year, with ≥70% HIV co-infection. Regional antenatal HIV prevalence is >30%. An outpatient TB programme cares for >1200 cases/year, and COSH sees a large caseload of M/XDR-TB.

Data collection and analysis

An anonymous, 100-item questionnaire was administered to HCWs. This instrument assessed TB IC knowledge (TB symptoms/transmission and the use of surgical masks/respirators), attitude (opinions regarding various TB IC tasks and topics) and practice (frequency of, and barriers to, TB IC implementation). Unannounced direct observations were conducted each weekday for two weeks. Staff were not generally informed of the purpose of the direct observations. Implementation of natural and mechanical ventilation, use of masks by TB cases, and use of respirators by staff were directly observed and recorded in general medical and TB wards, and radiology and outpatient departments. The presence/absence of TB IC policies and personnel, as well as routine TB screening/triage and isolation procedures and facilities, were also assessed by observation.

Data were organized into the three realms of TB IC, namely administrative (appoint a TB IC officer, develop a TB IC policy with monitoring and evaluation, separate cases/suspects, screen patients and separate/expedite suspect evaluation, cough hygiene, staff awareness of personal HIV status, redeploy HIV-positive staff from high-risk areas, staff seek TB diagnosis if symptomatic), environmental (natural/mechanical ventilation) and personal protective equipment (respirators for staff).[10] Blank or invalid responses to the questionnaire were not included in the analysis.

Questionnaire knowledge items were scored as correct/incorrect, attitude items were collapsed from five- to three-point rating scales, and the distributions of reported practice implementation frequency and barriers to greater implementation were recorded. Direct observations were compiled and compliance rates were calculated by hospital department. Data were used to describe TB IC KAP; knowledge and attitude were characterized by questionnaire, and practice was characterized by questionnaire and direct observation.

Results

Questionnaires were completed by 57 available HCWs. Of the respondents, 75.4% were female and 43.8% were professional or enrolled nurses. TB and medical ward workers comprised 40.4% and 36.8% of respondents, respectively. Career lengths ranged from less than six months (10.5%) to more than 20 years (5.3%), with most HCWs having worked for one to five years (35.1%). Ten hours of direct observation were conducted.

Knowledge

Respondents' knowledge of TB symptoms, transmission and respirators is presented in Table I. Other than 'fever', >90% of staff were able to identify classic pulmonary TB symptoms. Transmission-related knowledge was high. Respondents were

Table I
Knowledge of survey respondents

Knowledge element	Item	% Correct
Symptom identification	Night sweats (yes)	100.0
	Weight loss (yes)	100.0
	Cough for more than two weeks (yes)	96.5
	Coughing up blood (yes)	91.2
	Memory loss (no)	62.7
	Tiredness/malaise (yes)	91.1
	Pain with urination (no)	88.0
	Ear pain (no)	85.2
	Blurry vision (no)	74.5
	Watery eyes (no)	71.7
	Dizziness (no)	60.4
	Fever (yes)	58.9
	Headache (no)	54.9
	Many bacterial infections (no)	25.9
Transmission	Patients with active TB disease can infect people by coughing (true)	98.2
	TB is often spread from person to person through the air (true)	96.5
	TB is often spread from person to person by sexual contact (false)	94.7
	Patients with active TB disease can infect people by spitting (true)	93.0
	HIV-positive patients are more vulnerable to catching TB than HIV-negative patients (true)	89.5
	TB is often spread from person to person by blood (false)	83.9
	Patients with active TB disease can infect people by sharing food or drinks (false)	78.6
	Patients with active TB disease are more likely to infect others if they have a cough that produces a lot of sputum (true)	64.3
	Patients with active TB disease can infect people by talking (true)	19.6
Respirators	A wet or dirty N95 can still be used (false)	94.7
	Is this an N95 or a surgical mask? (surgical mask)	89.3
	Is this an N95 or a surgical mask? (N95)	89.3
	N95s protect healthcare workers and visitors by stopping TB particles from being breathed in (true)	85.7
	How often should you check if your N95 is airtight and does not allow any air to pass/leak? (every time you put on an N95)	78.6

TB, tuberculosis; HIV, human immunodeficiency virus.