



Tuberculin skin test conversion rate among short-term health care workers returning from Gaborone, Botswana



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Summary Our objective was to determine tuberculin skin test conversion rate of health care workers traveling to Botswana. The rate of tuberculin skin test conversion was 4.2% for the entire group studied or 6.87 per 1000 person weeks (95% CI, 1.87–17.60).

Background: International travel by health care workers traveling from low incidence countries to areas of the world where tuberculosis is highly endemic places the health care worker at an increased risk of acquiring tuberculosis.

Objectives: To determine the tuberculin skin test conversion rate of health care workers living in the United States with previously negative tuberculin skin test results working for less than 1 year in a hospital in Botswana where tuberculosis is highly endemic.

Methods: We performed a cross-sectional survey among health care workers affiliated with the University of Pennsylvania School of Medicine who participated in patient care in Botswana between July 1st 2004 and June 30th 2009. We recruited health care workers after returning from Botswana who had a documented negative tuberculin skin test in the year prior to travel, who spent at least 2 weeks but not more than 1 year and who had a documented tuberculin skin test 2–3 months post travel. The main study outcome was a positive tuberculin skin test 6–12 weeks after returning from Botswana, defined by an area of at least 10 mm induration 48–72 h after placement of the tuberculin skin test.

Results: 95 Subjects participated in the study and there were 4 tuberculin skin test conversions. The rate of tuberculin skin test conversion in our study population was 4.2% for the

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entire group studied or 6.87 per 1000 person weeks (95% CI, 1.87–17.60).

Conclusions: The tuberculin skin test conversion rate was higher than the reported conversion rates for those not working in a health care setting.

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Introduction

Aggressive public health measures and effective medication regimens have reduced the incidence and prevalence of tuberculosis in the United States to 12,898/year and 4.2/100,000 respectively [1]. As a consequence of the decrease prevalence of tuberculosis in the United States, the risk for health care workers working in the USA has also decreased. However, transmission of tuberculosis to individuals with history of travel to areas with high prevalence of tuberculosis continues to be an important concern [2].

The tuberculin skin test is an important test in identifying individuals with latent tuberculosis since in most individuals tuberculosis is initially contained by the host defenses and infection remains latent. Identification and treatment of latent tuberculosis reduces the risk of developing active tuberculosis by as much as 90 percent among immunosuppressed individuals [3]. Screening for latent tuberculosis should be performed in health care workers who have been in contact with patients with active tuberculosis.

Tuberculosis is endemic in many regions of the world especially in sub Saharan Africa. The prevalence of tuberculosis in Botswana was 400/100,000 in 2009 [4]. There is a potential for health care workers who have traveled internationally to regions where it is highly endemic to acquire tuberculosis and subsequently introducing it into countries where it has become rare. Although, several studies have focused on immigrants introducing TB into the United States [2,5], few studies have evaluated the role of international travel by health care workers.

This study was designed to determine the tuberculin skin test conversion rate of health care workers traveling to and working in a health care setting in Botswana for a time period between two weeks and one year. We hypothesized that tuberculin skin test conversion rate of health care workers traveling to Botswana would be higher in comparison to health care workers in the United States. This is due to the endemic nature of tuberculosis in Botswana as well as the lack of isolation precaution for patients with active tuberculosis and very limited availability and use of N95 respirator mask in the inpatient setting. Further, since global health care experiences are becoming increasingly common, some quantification of the rate of tuberculin skin test conversion would be useful in counseling such medical travelers about the risk of acquiring tuberculosis.

Methods

Study design and participants

We performed a cross-sectional survey among health care workers (medical students, residents, fellows and faculty)

affiliated with the University of Pennsylvania School of Medicine who participated in patient care at the Princess Marina Hospital and other health care facilities in Gaborone, Botswana. All subjects who traveled to Botswana between July 1st, 2004 and June 30, 2009 and had a documented negative tuberculin skin test less than one year prior to their travel. Health care workers who spent at least two weeks but no more than one year in Botswana were eligible for inclusion.

For most of the study the health care workers primarily worked on open wards with approximately 60 patients separated into 12 bed cubicles. The wards had many windows and were naturally well ventilated. There was no isolation of patients with active tuberculosis, with the occasional exception of a person suspected of having multiple drug resistant tuberculosis. This isolation consisted of placing the patient in a single room. There was no negative pressure, ultraviolet lighting, or antechamber to the room. Toward the end of the study, patients suspected of having multiple drug resistant tuberculosis or extensively drug resistant tuberculosis (but not other tuberculosis patients) were isolated in a separate ward where University of Pennsylvania medical students had no responsibility. This study was reviewed and approved by the Institutional Review Board at the University of Pennsylvania.

Main study outcome

The main study outcome was a positive tuberculin skin test 6 weeks to 12 weeks after returning from Botswana. We defined a positive tuberculin skin test as an area of induration of at least 10 mm 48 to 72 h after placement of 5 TU of purified protein derivative by Mantoux technique. All skin testing was done by student or occupational health services. Post travel positive tests were confirmed by an infectious disease trained physician.

Data collection

After obtaining informed consent, a questionnaire was administered to all subjects within 3 months after returning from Botswana. Data collected included age, duration of stay in Botswana, tuberculin skin test result prior to travel and 2–3 months after returning from Botswana, history of BCG vaccination, duration of time spent in inpatient and outpatient medical settings and use of N95 respirator mask.

Statistical analysis

Differences between groups were assessed using Student's *t*-tests for continuous variables and chi-square tests for categorical variables. Continuous variables were

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