Tuberculosis in health care workers during declining tuberculosis incidence in New York State

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Background: Nosocomial tuberculosis (TB) transmission has decreased dramatically in New York State since 1992; however, health care workers (HCWs) still compose >3% of TB cases.
Methods: Aggregate surveillance data on incident TB cases from 1994 to 2002 were examined for trends among HCWs. Additional information was available for HCW cases from 1998 to 2002, including facility type, tuberculin skin test (TST) result at hire, and treatment of latent TB infection (TLTBI).
Results: In New York State, 2.5% of TB cases in 1994 and 4.0% in 2002 were in HCWs (P value for trend <.001). Fifty percent of HCWs TB cases in 1994 and 77.6% in 2002 were in non-US born (P = .002) HCWs. Multidrug-resistant TB in HCWs decreased from 15.6% in 1994 to 6.9% in 2002 (P = .001). Of 297 HCWs TB cases in 1998-2002, 54.9% were TST positive at hire, and 21.2% had unknown TST result; 50.2% of 221 HCWs who were TST positive at or after hire met guidelines for TLTBI, and 23.4% received treatment. The highest proportion with unknown TST at hire and the lowest proportion receiving TLTBI were in ambulatory facilities.
Conclusion: Many HCWs who developed TB were either TST positive at hire and did not receive TLTBI or did not receive TST at hire. Facilities should encourage treatment for HCWs who meet criteria for TLTBI. Provider education should focus on ambulatory facilities. (Am J Infect Control 2005;33:519-26.)

At the peak of the most recent tuberculosis (TB) epidemic in the early 1990s, health care workers (HCWs) accounted for 3.2% of tuberculosis (TB) cases in the United States.[1] During this period, TB outbreaks occurred in hospitals as a result of transmission from patients to other patients and to HCWs.[2-5] In some of these outbreaks, there was nosocomial spread of multidrug-resistant (MDR) TB strains to HCWs, some of whom were coinfected with human immunodeficiency virus (HIV).[4-6]

In response to the epidemic, guidelines for improved tuberculosis control practices in health care settings were published, which emphasized the following: (1) early identification, diagnosis, and isolation of suspected TB patients; (2) environmental controls to reduce the concentration of tubercle bacilli in high-risk areas, and (3) use of personal protection for health care workers who cared for suspected TB patients.[7,8] These guidelines led to better infection control practices.[9,10] In addition, public health TB control program measures were strengthened. TB case surveillance, detection, and completion of treatment of TB cases improved, with greater completion of treatment achieved largely through enhanced case management and direct observation of treatment.[11] TB incidence declined dramatically both nationally and in New York City (NYC) where the largest number of TB cases had been reported.[9,12,13]

After 10 years of declining tuberculosis incidence, HCWs still contribute approximately 4% of tuberculosis cases in New York State (NYS). In the present paper, we describe the current epidemiology of TB in HCWs and examine potential areas for prevention.

METHODS

TB surveillance reports in NYS were reviewed to determine the incident number of TB cases that met the Centers for Disease Control and Prevention (CDC) case definition[14] of TB disease from January 1, 1994, to December 31, 2002. Reporting of suspected and confirmed tuberculosis cases is mandated by the state and city health codes. Demographic information for HCWs and non-HCWs, including employment in the 2 years preceding diagnosis as well as bacteriologic, TB treatment, and outcome information were obtained

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Table 1. TB cases in HCWs by selected characteristics and year, 1994-2002

	New York City									Rest of New York State								
	Total TB cases	TB cases in HCWs		TB in US-born HCWs		TB in Non-US-born HCWs		MDR in HCWs		Total TB cases	TB cases in HCWs		TB in US-born HCWs		TB in Non-US-born HCWs		MDR in HCWs	
Year	No.	No.	%	No.	%	No.	%	No.	%	No.	No.	%	No.	%	No.	%	No.	%
1994	2995	72	2.4	32	44.4	40	55.6	12	16.7	641	18	2.8	13	72.2	5	27.8	2	11.1
1995	2445	40	1.6	16	40.0	24	60.0	6	15.0	621	15	2.4	6	40.0	9	60.0	0	0.0
1996	2053	58	2.8	28	48.3	30	51.7	13	22.4	535	27	5.0	16	59.3	11	40.7	0	0.0
1997	1730	57	3.3	16	28.1	41	71.9	2	3.5	535	25	4.7	8	32.0	17	68.0	0	0.0
1998	1558	61	3.9	24	39.3	37	60.7	2	3.3	442	12	2.7	3	25.0	9	75.0	0	0.0
1999	1460	47	3.2	15	31.9	32	68.1	1	2.1	377	15	4.0	6	40.0	9	60.0	0	0.0
2000	1332	42	3.2	14	33.3	28	66.7	1	2.4	412	14	3.4	4	28.6	10	71.4	0	0.0
2001	1261	38	3.0	10	26.3	28	73.7	4	10.5	415	10	2.4	5	50.0	5	50.0	0	0.0
2002	1084	43	4.0	8	18.6	35	81.4	4	9.3	350	15	4.3	5	33.3	10	66.7	0	0.0
Total	15,918	458	2.9	35.6	7.8	295	64.4	45	9.8	4328	151	3.5	66	43.7	85	56.3	2	1.3

MDR, multidrug resistant.

from patient interviews and medical record reviews conducted at the time of TB diagnosis. These data are routinely collected for TB surveillance.

In 1993, the HCW occupations of TB patients was added to characteristics of TB cases reportable to the CDC, and, in 1994, NYC began systematic collection of the HCW occupations of TB patients.[15,16] In the rest of New York State (RNS), this information had been collected since 1992. A HCW was defined as any person (paid or voluntary) who worked at a health care facility in or outside the United States any time during the 24-month period preceding diagnosis of tuberculosis.[7] All HCWs with TB verified during the study period were included in the analysis. The classification of occupation and industry categories in the United States Census were changed in the 2000 Census from those used in the 1990 Census. Therefore, a comparison of the TB case rate in the early 1990s to the case rate in 2002 could not be made. For 2002, the TB case rate was determined using 2002 HCW TB cases in the numerator and the number of HCWs from the 2000 US Census in the denominator. Estimates of the number of HCWs were obtained from the public use microdata sample of the US Census.

Beginning in January 1998, enhanced HCW surveillance was implemented as a result of a cluster of TB cases discovered among HCWs employed by 1 hospital. The goal of the enhanced surveillance was to facilitate early identification and communication regarding such TB exposures between TB control programs and health care facilities and to clarify procedures for case management and follow-up of HCWs until completion of treatment. In NYC, the protocols included notification of the director of employee or occupational health services at the health care facility within 5 days of identification of the case and monthly updates on the clinical status, bacteriologic status, adherence to monthly medical visits, and directly observed therapy.

Additional variables collected from this enhanced surveillance were health care facility at time of diagnosis, date of hire, occupation, work location, tuberculin skin test (TST) history, treatment of LTBI, and sources of exposure, if known. A positive TST result was defined as having an induration reaction of >10 mm to purified protein derivative tuberculin using a Mantoux test. If the millimeters of induration were not reported, a TST result was considered positive if it was reported as such by the medical provider or health care facility at which the HCW was employed. Multidrug-resistance (MDR) was defined as resistance to at least isoniazid and rifampin. Health care facilities were grouped into the following categories: hospital, home health care, nursing home, ambulatory care facility (including private providers and others such as dental offices). HCW job category was determined by the health care facility or by the reporting agency. The trends in selected characteristics were described for the period 1994 through 2002. The χ^2 for trend was obtained, and significance level was set at $P < .05$. Descriptive analyses were performed for the additional variables obtained from the enhanced surveillance for the period 1998 through 2002. Data are shown separately for NYC, RNS, and total NYS. Data were analyzed using PC SAS software (SAS Institute, Cary, NC, version 8.02).

These activities and analyses received waiver from institutional review board review by the New York City Department of Health and Mental Hygiene. In addition, this project was reviewed by the Associate Director for Science of the National Center for HIV, STD, and TB Prevention of the CDC and the New York State