

Factors influencing health care workers' adherence to work site tuberculosis screening and treatment policies

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Background: Despite the known risk of tuberculosis (TB) to health care workers (HCWs), research suggests that many are not fully adherent with local TB infection control policies. The objective of this exploratory study was to identify factors influencing HCWs' adherence to policies for routine tuberculin skin tests (TSTs) and treatment of latent TB infection (LTBI).

Methods: Sixteen focus groups were conducted with clinical and nonclinical staff at 2 hospitals and 2 health departments. Participants were segmented by adherence to TST or LTBI treatment policies. In-depth, qualitative analysis was conducted to identify facilitators and barriers to adherence.

Results: Among all focus groups, common themes included the perception that the TST was mandatory, the belief that conducting TSTs at the work site facilitated adherence, and a general misunderstanding about TB epidemiology and pathogenesis. Adherent groups more commonly mentioned facilitators, such as the perception that periodic tuberculin skin testing was protective and the employee health (EH) provision of support services. Barriers, such as the logistic difficulty in obtaining the TST, the perception that LTBI treatment was harmful, and a distrust of EH, emerged consistently in nonadherent groups.

Conclusions: This information may be used to develop more effective interventions for promoting HCW adherence to TB prevention policies. Informed efforts can be implemented in coordination with reevaluations of infection control and EH programs that may be prompted by the publication of the revised TB infection control guidelines issued by the Centers for Disease Control and Prevention in 2005. (*Am J Infect Control* 2004;32:456-61.)

Epidemiologic data for 2002 indicate that, although the overall number of U. S. tuberculosis (TB) cases has decreased by 43% from the 1992 peak, certain groups remain at risk for acquiring TB.¹ Historically, tuberculin skin test (TST) conversion rates have suggested an elevated risk for occupational exposure among health care workers (HCWs).^{2,3} Several health care-associated outbreaks in the 1980s and 1990s further highlighted this risk. Some of the outbreaks involved transmission

of multidrug-resistant TB and resulted in mortality among both patients and HCWs.^{4,5}

In response to these outbreaks and the resurgence of TB in the early 1990s, the Centers for Disease Control and Prevention (CDC) developed "Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in health care facilities, 1994."⁶ Recognizing the need to protect employees and patients, local health care facilities adopted these guidelines and established policies for administrative measures, including routine tuberculin skin tests (TSTs) for HCWs and evaluation for treatment of latent TB infection (LTBI) for those with a positive TST. Since the implementation of the infection control measures nationwide, health care-associated transmission has substantially declined.⁷⁻¹² The guidelines are currently being revised to reflect the changing epidemiology of TB and to incorporate the latest findings from infection control research.

Literature suggests that many HCWs do not fully adhere to routine workplace screening and treatment policies. Among physicians, adherence rates for placement and reading of the TST range from 30% to 72%.¹³⁻¹⁶ Rates of adherence to treatment for LTBI vary even more

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Table 1. Focus group segmentation plan*

Tuberculin skin testing	
Adherent (n = 29)	Received tuberculin skin test on time
Nonadherent (n = 26)	Did not receive tuberculin skin test on time
Treatment for latent TB infection	
Adherent (n = 25)	Completed treatment regimen for latent TB infection
Nonadherent (n = 26)	Did not accept or complete treatment regimen for latent TB infection

*Total participants (N = 106).

widely from 8% to 82%.^{13,14,17-19} In sum, these studies reveal suboptimal HCW adherence to routine TSTs and initiation and completion of LTBI treatment.

Less is known about the factors influencing HCWs' abilities or decisions to adhere to screening and treatment. Among physicians, a low perceived risk of TB and the voluntary nature of screening programs may be barriers to TST adherence.¹⁶ Experiencing adverse drug effects and receiving the Bacillus Calmette and Guérin (BCG) vaccination have both been associated with nonadherence to LTBI treatment.¹⁹ Conversely, researchers have speculated that high adherence rates are attributable to effective administrative controls, monitoring, counseling, and education.^{18,19}

Previous research on HCWs' adherence has been limited by small sample size, narrow inclusion criteria (eg, only nursing students), or reliance on self-reporting. Moreover, data collection methods have been limited to written surveys and to reviews of medical records and employee health databases. Responding to the need for additional research in this area and the revision of the CDC TB infection control guidelines, we undertook an exploratory study to identify factors that influence HCWs' adherence to routine TST and LTBI treatment policies. In the present study, the term *health care worker* was defined broadly to encompass a wide range of staff employed by the health care facility, including employees with no direct patient contact.

METHODS

Researchers conducted 16 focus groups with HCWs at 4 health care facilities. The study site recruitment process was intended to maximize variation among possible responses. Two health departments and 2 hospitals were selected as study sites, based on local TB incidence, number of TB patients receiving care at the facility, incidence of nosocomial TB infections, and geographic location (ie, urban, suburban, or rural) as well as willingness of facilities to participate.

At the study sites, the departments responsible for TB screening and treatment of HCWs with LTBI, termed *employee health* (EH) in this study, used databases to find and recruit HCWs based on adherence or non-adherence to TSTs and LTBI treatment. Adherence to LTBI treatment was ascertained by previous self-report to EH. The focus groups were established by EH using the segmentation plan and adherence definitions presented in Table 1. Identifying data were maintained by EH at all sites.

To ensure consistency, the same professional moderator, who has not been involved with local or national infection control policy or practice, facilitated all 16 focus groups. The moderator used a standard discussion guide to ensure consistency of prompts and probes between all focus groups; however, in each focus group, there was also the opportunity for unstructured discussion between participants. Each group consisted of 4-8 HCWs. The subtotals of participants in each segment are presented in Table 1. Participants were reminded about the confidentiality of their responses and were given a monetary incentive for participating. Tuberculosis educational materials were available at the conclusion of each 90-minute to 2-hour discussion. Focus group discussions were audiotaped and transcribed in a manner that preserved participants' anonymity. Prior to data collection, this research was granted all appropriate institutional review board (IRB) approvals and oversight by CDC and the participating health care facilities.

We performed in-depth qualitative analysis of the transcripts using Atlas.ti software (Scientific Software Development, Berlin, Germany). Based on findings from the literature and specific issues cited in the 1994 CDC infection control guidelines, we developed an initial a priori framework for assessing the transcripts. We also used general tenets of grounded theory in reviewing the raw data, thus allowing additional concepts to emerge from the participants' responses.²⁰ Standard qualitative data reduction techniques were applied to create and categorize codes and examine relationships among them. The codes were continuously revised throughout the testing of intercoder reliability to enhance both the construct validity of the codes and the reliability of the coders. A final set of 150 codes was developed reflecting key themes related to facilitators and barriers to adherence (Table 1).

RESULTS

A total of 106 HCWs participated in 16 focus groups. Participants represented a broad range of occupations including clinical, administrative, janitorial, clerical,

and security staff. Full- and part-time, as well as U. S. and foreign born, HCWs participated.

Common themes across adherent and nonadherent groups

Several common themes emerged across both the adherent and the nonadherent groups. Focus group participants believed that taking part in the TST program was mandatory practice for their facility, whether or not it was, and reported that active follow-up and repercussions by EH staff and supervisors prompted adherence. Repercussions included suspension from work and withholding of paychecks. Reflecting the impact of these policies, one participant remarked, "Let's put it this way, if we weren't forced or suspended, I don't think people would actually show up."

Participants stated that certain EH procedures and services enhanced the ability of HCWs to complete the TST process. Conducting the TST at the HCW's work site was frequently mentioned as being "easy" and "convenient." HCWs also reported that adherence was easier when the TST could be read by nurses outside of the EH office or at off-site clinics. Many participants suggested extending EH hours to evenings and weekends for off-peak shift workers and providing advance notice of testing days and reminders to facilitate adherence.

Many participants felt that their positions within the facility put them at risk for TB infection and perceived this risk to be related to contact with both the patients and the general public. Repeatedly, participants in nonclinical areas, such as security, deliveries, and vital records, reported concern over potential TB exposure from casual contact with the public. Routine TST requirements were often deemed reasonable owing to perceptions about elevated TB risk, as highlighted by the statement, "I come into contact with a lot of patients ... that's why I know I need to be tested annually."

Regarding LTBI treatment, participants expressed confidence that treatment for LTBI "almost ensures" prevention of active TB disease. However, participants also reported that adverse events, which were perceived as inevitable, and contraindications, such as alcohol consumption, were deterrents to accepting treatment for many HCWs.

Although participants explicitly acknowledged a lack of information among HCWs regarding TB, they often reported that education provided by EH staff enhanced acceptance of the TST requirements. Participants raised questions about general TB issues, such as transmission, symptoms, and treatment, and the difference between active disease and latent infection. Many participants requested additional TB education for

themselves as well as for other HCWs. Participants also suggested that educating HCWs about LTBI reduced anxiety and fear about a TST conversion. This was voiced as, "There were a number of people that tested positive and everyone got upset about it because no one knew about the germ itself... They [EH] had come out and did a little video about it to make people more aware of what the germ was and when it's full blown. It kind of relieved everybody."

Discussion of the BCG vaccine also raised questions and highlighted concerns about TST validity, some considering a positive result a consequence of BCG vaccination and not TB infection. One participant described the attitude toward the TST and BCG vaccine in Mexico: "In my country, this kind of test is really like if it [the TST] is positive, that means that the vaccine worked. You have the virus in your lungs. It's sleeping. And if you are negative, it [the BCG vaccine] didn't work."

Stigma associated with TB infection and disease emerged both explicitly and implicitly in focus group discussions. Participants stated that HCWs fear coworkers who test positive because they do not know the difference between LTBI and TB disease. One participant confided, "If you test positive for the germ some people do treat you differently." Further highlighting this stigma, several statements associated TB with lifestyle choices and substance abuse and blamed homeless persons and undocumented immigrants for spreading the disease. Again, some participants suggested increased education as a way to diminish social stigma associated with TB.

Across the groups, participants demonstrated a basic awareness of most TST and LTBI treatment policies, including routine testing, criteria for determining TST exemption, and LTBI treatment recommendations, although they were less familiar with protocols as they relate to BCG-vaccinated HCWs.

Major themes in adherent groups

Participants who were adherent to screening policies asserted that the TST was an effective way to protect themselves, their families, and coworkers from TB. "It's a protection for us to find out if we do have it. And if we do have it, then our families have probably been exposed to it. It also protects the health department by keeping its employees healthy and on the job," commented one participant. Others reported the periodic TST gave reassurance that they were negative and provided a sense of "relief." HCWs reported that the periodic TST made them feel safer knowing that their coworkers were not contagious.

Participants in the TST and LTBI treatment adherent groups offered positive comments regarding the EH

support services, stating that EH carefully tracked them to ensure completion of treatment and provided counseling and emotional support upon an LTBI diagnosis. Said one participant, "Occupational Health did call me during my treatment to see if I had questions, to make sure I was still taking my medication, and to find out what treatment I was doing, just to kind of be there as a support, I think." In some situations, participants reported that EH offset the costs of care received through HCWs' private providers.

Major themes in nonadherent groups

Participants in the TST nonadherent groups frequently reported experiencing logistic difficulties in having the TST placed and read. Off-peak shift workers reported that testing schedules were inconvenient. Furthermore, participants commented that having to visit the EH office was "a hassle" and "hiking over to employee health" to wait to be tested and to return in 2 or 3 days for the reading were significant deterrents.

Distrust and lack of confidence in the EH office were frequently mentioned by the TST nonadherent participants. For example, participants at 2 sites reported concerns that EH's primary intention was to increase the number of TST completions for accounting purposes, rather than to manage the health needs of HCWs. This sentiment was revealed by the comment, "They [EH] give all these tests year after year. Nobody is exposed. So, they're just giving tests. And maybe that's why some people really feel that all they're trying to do is get the numbers up for the number of TB tests that are done annually." Other comments reflected apprehension about the skills of the EH staff in placing and reading the TST.

Regarding LTBI treatment, nonadherent participants were suspicious that the medication was harmful. This belief was based on knowledge of potential adverse effects as well as a generally negative perception of LTBI treatment. Repeatedly, participants described it as "terribly bad," "too aggressive," and "toxic." Nonadherent participants often suggested that HCWs with LTBI might hesitate to start a long treatment regimen that could cause sickness when they have no symptoms. "Well, if you know a little bit about the disease and, like we say, if it's latent ... you are not sick. It's only ... if it becomes active, then you are liable to be sick and probably very sick. So then you consider taking the medicine that is terribly bad; which is worse? That's when you weigh what's best for you."

Participants who were nonadherent to LTBI treatment frequently reported that their private physicians discouraged them from starting treatment. Common reasons were age, hepatotoxicity, or simply that the treatment was unnecessary. One participant explained,

"[My private doctor] said she would not recommend [LTBI treatment]...that it was overkill." Other participants stated that their physicians did not offer treatment after a clear chest radiograph was established. Similarly, several participants in the nonadherent groups reported that EH did not initiate a discussion about treatment after a positive TST.

Participants who were nonadherent to LTBI treatment often expressed anxiety, anger, fear, and humiliation in response to an LTBI diagnosis. The comment, "I thought I was dying," was made repeatedly among these participants. Additionally, misunderstandings of the epidemiology and transmission of TB, such as the belief that TB was hereditary or a blood infection and that transmission could occur through handling writing utensils or office folders, emerged frequently in TST and LTBI treatment nonadherent groups.

DISCUSSION

The focus group discussions revealed multiple facilitators and barriers to HCWs' adherence to TST and LTBI treatment policies, which are summarized in Tables 2 and 3. Generally, the nonadherent groups tended to underscore factors that impeded adherence, while adherent groups highlighted facilitators.

Lack of knowledge about TB was a consistent theme throughout the discussions. This finding emerged from explicit statements HCWs made about their own incomplete understanding, as well as from comments that implicitly reflected a poor understanding of the difference between infection and disease, the risks to HCWs, the role of the TST, and the effectiveness of LTBI treatment. Furthermore, the degree of misunderstanding among HCWs with a previous positive TST result is concerning because these individuals are most in need of appropriate education about LTBI and the benefits of treatment. Considering the demonstrated importance of knowledge as a facilitator to adherence,^{21,22} these findings suggest the need to provide more comprehensive and periodic TB education to HCWs through such mechanisms as brown-bag series, institutionally required infectious disease training, or distribution of written educational materials during periodic TB screenings. This education may include topics such as new infection control guidelines, changing local TB epidemiology, sources of TB risk to HCWs, and importance of periodic screening and treatment for LTBI.

The experience of receiving contradictory messages from other HCWs, EH staff, and private providers created frustration for some HCWs and seemed to inhibit their trust in EH programs. This suggests that, wherever possible, educational outreach should be coordinated to communicate clear and consistent messages to HCWs. Additionally, EH staff can be trained

Table 2. Adherence to routine tuberculin skin testing

Facilitators	Barriers
Worksite visits by EH staff for placing and reading tuberculin skin tests	Poor TB knowledge Inconvenient testing times, days, and locations
Testing during off-peak hours	Long wait times at EH office
Supervisory involvement	Distrust or lack of confidence in EH
Mandatory testing	Doubts about tuberculin skin test validity
Active follow-up after missed tuberculin skin tests	
Perception that tuberculin skin test program provides protection for oneself and others	
Perception that tuberculin skin test program is appropriate for the level of risk	

so that conflicting or incorrect information regarding the TST or treatment for LTBI is minimized. Participants repeatedly suggested that the annual TST sessions would provide an ideal opportunity for EH staff to share individually tailored TB information with HCWs. Conducting one-on-one education with HCWs who are TST positive may facilitate supportive relationships between HCWs and EH staff, which have the capacity to enhance adherence.²³ This practice may also help address the mistrust and lack of confidence that some HCWs voiced as a barrier to adherence to routine TSTs and LTBI treatment.

HCWs adherent to LTBI treatment reported that receiving information and coordinated support services from EH, such as follow-up phone calls during treatment or payment of treatment costs, facilitated adherence, even when their private physician managed their care. Receiving emotional and informational support was a major facilitator among some participants and suggests that EH staff may need to assume this role when needed. Furthermore, enhanced coordination with private providers may be especially important, considering that many private physicians do not recommend LTBI treatment, a finding particularly noted among nonadherent groups. This practice, which has been documented elsewhere,²⁴ deters institutional as well as individual adherence. These physicians reportedly conveyed that the treatment might actually be “harmful,” despite clinical trial evidence of low hepatotoxicity rates associated with isoniazid, the most frequently recommended drug.²⁵ In addition, the use of the QuantiFERON-TB test (Cellestis Limited, Victoria, Australia) to differentiate between

Table 3. Adherence to treatment for latent TB infection

Facilitators	Barriers
Provision of comprehensive support services by EH	Perception that treatment is generally harmful, with a high probability of causing adverse effects
Coordination and communication with private providers	Perception that, without TB symptoms, there is no need for medication
Ongoing counseling, including information and emotional support	Misunderstanding of TB pathology
Active follow-up with telephone phone calls to HCWs	Failure of private providers and EH staff to recommend treatment
Confidence in treatment effectiveness	Insufficient emotional and informational support provided by EH
	Distrust or lack of confidence in EH

LTBI and a reaction caused by prior BCG vaccination may address HCWs' concerns about the validity of the TST.²⁶ Educational efforts targeting HCWs' private physicians to update them on the most recent clinical guidelines for LTBI diagnosis and treatment can address these issues.

The focus group data consistently revealed logistic barriers associated with being screened and evaluated for LTBI treatment. HCWs who worked off-peak hours were most disadvantaged in terms of having the TST placed and read, especially when having to visit the EH office on their personal time. However, several facilities offered TST services at HCWs' work sites, which reportedly facilitated adherence. Generally, routine TST programs that incorporated supervisory involvement were better able to ensure adherence. Factors that would appear to foster adherence substantially include reducing logistic barriers by implementing a work site visitation program; minimizing wait times at the EH office through scheduling, extending EH office hours, and allowing EH office visits during work time; and increasing supervisory involvement in monitoring adherence.

Although the methods were appropriate for this exploratory study, the use of focus group methodology normally prohibits a wide generalization of findings. However, the diversity among sites and participants, as well as the local contexts in which the study occurred, enhances the usefulness and broader application of the findings. Further, extensive analysis showed a high level of repetition of themes among the groups and sites, indicating a saturation of response.

Several limitations to this study exist. One possible limitation was that group segmentation criteria were not uniform across all 4 sites, owing to disparate EH information systems and policies. However, this

tailoring has made the findings more meaningful to the individual sites. Another potential limitation and additional finding was the classification of TST-positive HCWs as nonadherent, although they were never formally recommended treatment for LTBI. All sites relied on previous self-report to determine adherence to LTBI treatment. Finally, as with all focus group research, it is not known whether those who participated in the focus groups differed in any way from those who did not.

This study has produced needed insight into HCWs' perceptions, attitudes, and experiences regarding policies for routine work site TSTs and LTBI treatment. For the most part, the identified barriers to adherence can be addressed by enhancing infection control practices. Furthermore, information regarding facilitators can be used as a rationale to continue certain activities or initiate others. Informed efforts to increase HCWs' adherence can be implemented in coordination with the revised CDC 2005 TB infection control guidelines. This research complements previous studies by generating a rich explanation for low HCW adherence rates and provides guidance to EH and infection control administrators in developing more effective mechanisms to enhance HCWs' participation in these important programs.

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