Current Approach to Latent Tuberculosis Diagnosis and Treatment among Medical Center Occupational Health Physicians

Author(s): Christopher Vinnard, MD, MPH, MSCE; Darren Linkin, MD, MSCE; Amy Behrman, MD

Reviewed work(s):
Source: *Infection Control and Hospital Epidemiology*, Vol. 33, No. 12 (December 2012), pp. 1262-1265
Published by: The University of Chicago Press on behalf of The Society for Healthcare Epidemiology of America
Stable URL: http://www.jstor.org/stable/10.1086/668437
Accessed: 27/11/2012 09:50

CONCISE COMMUNICATION

Current Approach to Latent Tuberculosis Diagnosis and Treatment among Medical Center Occupational Health Physicians

Christopher Vinnard, MD, MPH, MSCE;[1] Darren Linkin, MD, MSCE;[2] Amy Behrman, MD[3]

We surveyed physicians in a national occupational medicine society regarding diagnosis of latent tuberculosis infection in healthcare workers. Most respondents used a combination of skin testing and interferon gamma release assays. Respondents integrating interferon gamma release assays into screening placed greater importance on employee acceptability and convenience.

Infect Control Hosp Epidemiol 2012;33(12):1262-1265

In response to rising tuberculosis rates in hospitals between 1985 and 1993, the Centers for Disease Control and Prevention (CDC) issued guidelines for decreasing the risk of transmission in healthcare facilities, including screening healthcare workers (HCWs) for latent and active tuberculosis.[1] There is clear evidence that changes in institutional practices have reduced the transmission of tuberculosis in healthcare facilities.[2]

The CDC guidelines were revised in 2005 and included clarification of hospitals' transmission risk categories and formal recommendations on using interferon gamma release assays (IGRAs) for latent tuberculosis infection (LTBI) screening in HCWs.[3] There are several potential advantages of IGRAs over tuberculin skin tests (TSTs). IGRAs are blood tests that obviate the need for follow-up visits, repeated IGRA testing does not lead to a boosting phenomenon that could influence interpretation, and prior bacillus Calmette-Guérin (BCG) vaccination does not influence the results of IGRAs.[4] Although the CDC guidelines state that prior BCG vaccination should not be considered in the evaluation of a positive TST, HCW acceptance that a positive TST requires treatment is reduced among individuals with a history of BCG vaccination,[5] including physicians.[6] HCWs who otherwise meet criteria for LTBI treatment may be more willing to accept it when IGRA results are included in counseling.[7]

IGRAs are increasingly available for LTBI screening, although understanding of their diagnostic performance is still evolving.[8] Little is known about how these tests are integrated into the clinical practice of occupational physicians in healthcare facilities. Specific LTBI screening practices within US hospitals were last surveyed in 1992, prior to the wide availability of IGRAs.[9] Our objective was to determine the current practices for diagnosing LTBI by occupational physicians in healthcare settings and to understand attitudes motiving the selection of IGRAs versus TSTs.

METHODS

Setting and participants. We surveyed physician members of the Medical Center Occupational Health (MCOH) Section of the American College for Occupational and Environmental Medicine, the nation's largest society dedicated to the health of workers (http://www.acoem.org/medical_center_occ_health.aspx).

Data collection. Section members were invited to complete an anonymous web-based survey (SurveyMonkey), developed with input from infection control practitioners at the authors' institutions, along with the Director of the Tuberculosis Control Program in Philadelphia, and piloted in a convenience sample of occupational health physicians.

Analysis. We described respondents regarding the characteristics of their health care facilities. We then classified survey respondents on the basis of their reported approach for diagnosing LTBI: (1) using TSTs exclusively, (2) using a combination of TSTs and IGRAs, and (3) using IGRAs exclusively. We determined the relationship of specific attitudes with respondents' LTBI screening approaches, using a 5-point Likert scale (1 "strongly disagree" to 5 "strongly agree"). We compared respondents that exclusively used TSTs with respondents who had integrated IGRAs into their screening approach, either alone or in combination with TSTs (in any fashion), using the nonparametric Kruskal-Wallis test to compare Likert responses between the 2 groups.

RESULTS

We obtained 116 responses from 282 registered MCOH members (41%). Respondents were from 34 states: most respondents (79/11, 71%) worked at nongovernmental, not-for-profit medical facilities, with 14/111 (13%) at for-profit, investor-owned facilities, 7/111 (6%) at federal government facilities, and 11/111 (10%) at nonfederal government facilities (denominators provided because not all respondents answered all questions). Most respondents worked in academic settings, with 92/109 (84%) reporting that medical/dental trainees worked at the facility, and 81/102 (79%) reporting that medical/dental students rotated at the facility. Regarding CDC risk categories for tuberculosis transmission,[1] 54/96 (56%) reported working at a low-risk facility, 36/96 (38%) at a medium-risk facility, and 6/96 (6%) reported the potential for ongoing transmission at their facility.

Overall, 26% of respondents reporting using TSTs exclusively, 7% used IGRAs exclusively, 67% used a combination of TSTs and IGRAs, and 28% used IGRAs only for HCWs with a history of BCG vaccination (Table 1). Among respondents

TABLE 1. Approach to LTBI Screening and Treatment among Occupational Health Physicians

LTBI screening or treatment approach	No. of respondents (%)
What are the annual screening practices? (n = 100)	
All employees receive annual screening	34 (34)
Only employees with direct patient contact receive annual screening	41 (41)
Only baseline screening for LTBI	14 (14)
Another approach	11 (11)
Who is offered LTBI treatment? (n = 102)	
Only employees with a documented test conversion	55 (54)
All employees with a positive test, regardless of baseline testing status	47 (46)
Is IGRA available onsite? (n = 102)	
Yes	46 (45)
No	56 (55)
What type of IGRA is available? (n = 103)	
Qualitative IGRA only	43 (42)
Both quantitative and qualitative IGRA	36 (35)
Only TST testing is used	24 (23)
What LTBI screening approach is used? (n = 94)	
TST exclusively	24 (26)
IGRA exclusively	7 (7)
IGRA testing reserved for employees with a history of BCG	26 (28)
Another sequential testing approach	37 (39)
Providers that use a sequential testing approach (n = 37)	
IGRA as a confirmatory test for all employees with positive TST	26 (70)
IGRA as a confirmatory test for selected employees with positive TST	10 (27)
IGRA as a confirmatory test for all employees with negative TST	1 (3)

NOTE. BCG, bacillus Calmette-Guérin; IGRA, interferon gamma release assay; LTBI, latent tuberculosis infection; TST, tuberculin skin test.

using a sequential testing approach, 70% reported using IGRA as a confirmatory test in all employees with a positive TST, and 27% reported using IGRA as a confirmatory test in selected workers with a positive TST. Respondents who integrated IGRA testing into their LTBI screening were more likely to work at facilities with trainees (P = .01) and students (P < .01) but otherwise reported similar characteristics regarding organizational structure (P = .21), size (P = .26), number of employees (P = .22), and CDC risk category (P = .43), compared with respondents that relied exclusively on TSTs.

There were no differences in attitudes between respondent groups regarding test costs, the costs related to HCWs missing work for TST readings, or the usefulness of IGRAs or TSTs in providing baseline values for subsequent follow-up (Table 2). However, respondents who used IGRA testing (alone or in combination with TSTs) placed greater importance on employee acceptance of a positive test (P < .01) and employee convenience (P < .01), compared with respondents who relied exclusively on TSTs. Respondents who had integrated IGRAs into their testing were more likely to avoid LTBI treatment for HCWs with a positive TST but a negative IGRA (P < .01). Both groups reported similar neutral attitudes regarding treatment of HCWs with a history of BCG and a positive TST (P = .12) and regarding treatment of HCWs with recent conversions and negative IGRAs (P = .58). Both groups were strongly inclined to treat HCWs with recent TST conversions and positive IGRAs (P = .07).

CONCLUSIONS

In their 2006 editorial, Villarino and Mazurek[10] wrote that the 2005 CDC guidelines for the diagnosis of LTBI in HCWs "are best used as a guide, rather than a directive for setting infection control policy." In our national survey of MCOH physicians, we identified significant variability in current LTBI screening practices. Most surveyed MCOH physicians reported using a combination approach, including both TST and IGRAs for screening HCWs, with only 26% using TSTs alone. Use of IGRAs was associated with working at an academic medical center and an increased physician perception of HCW convenience and result acceptance.

Our study was limited by inability to assess the respondent LTBI practices directly, relying instead on their self-assessment and reporting. In addition, the survey response rate (41%) was lower than anticipated, possibly reflecting the proportion of section members who participate actively. Finally, our sample size precluded performing multivariable analysis to determine whether some factors were collinear rather than independent predictors of LTBI diagnostic practices.

Our findings highlight some of the challenges in translating recent scientific advances into current clinical practice. As research continues to characterize IGRA and TST performance characteristics for LTBI detection, clinical encounters between HCWs and occupational health physicians are also evolving. Prior work has shown that HCWs commonly misunderstand

TABLE 2. Attitudes and Practices of Occupational Health Physicians

	Mean Likert score (SD)		
	TST only (n = 20)	Some IGRA (n = 66)	P[a]
Attitude			
The cost of the test was an important factor in the choice of LTBI testing strategy at my facility.	3.4 (1.2)	3.9 (0.96)	.10
The cost of missed employee work time was an important factor in the choice of LTBI testing strategy at my facility.	2.5 (0.89)	3.0 (1.1)	.09
The convenience of the testing method from the employee's perspective was an important factor in the choice of LTBI testing strategy at my facility.	2.4 (1.2)	3.3 (1.1)	<.01
The willingness of the employee to accept that a positive test represented latent infection was an important factor in the choice of LTBI testing strategy at my facility.	2.4 (1.0)	3.5 (1.0)	<.01
TST-based testing provides baseline values that can be easily followed in subsequent annual screening.	3.9 (0.81)	3.8 (0.93)	.98
IGRA-based testing provides baseline values that can be easily followed in subsequent annual screening.	3.1 (0.85)	3.3 (0.97)	.37
Practice			
An employee with a history of BCG vaccination, a positive TST, and no medical contraindications should be offered treatment for LTBI.	3.5 (1.1)	3.0 (1.3)	.12
An employee with a history of BCG vaccination, a positive IGRA, and no medical contraindications should be offered treatment for LTBI.	4.0 (0.69)	4.2 (0.88)	.07
An employee with a history of BCG vaccination, a positive TST, a negative IGRA, and no medical contraindications should be offered treatment for LTBI.	2.6 (0.68)	2.1 (1.0)	<.01
An employee with a history of recent TST conversion, a positive IGRA, and no medical contraindications should be offered treatment for LTBI.	4.4 (0.75)	4.8 (0.45)	.07
An employee with a history of recent TST conversion, a negative IGRA, and no medical contraindications should be offered treatment for LTBI.	3.0 (0.97)	3.2 (1.4)	.58

NOTE. IGRA, interferon gamma release assay; LTBI, latent tuberculosis infection; SD, standard deviation; TST, tuberculin skin test.
[a] Kruskal-Wallis test.

the purposes of LTBI screening and the interpretation of results.[5] Additional efforts aimed at improving HCW acceptance that a positive LTBI test requires treatment may lead to further reductions in tuberculosis transmission in healthcare settings.

ACKNOWLEDGMENTS

We thank the MCOH network and its members who participated in the survey and Melanie Swift for assisting with distribution of the survey. We also thank Keith Hamilton, David Allan, Susan Blake, and David Schlossberg for providing feedback on the survey content.

Potential conflicts of interest. All authors report no conflicts of interest relevant to this article. All authors submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest, and the conflicts that the editors consider relevant to this article are disclosed here.

Affiliations: 1. Drexel University College of Medicine, Philadelphia, Pennsylvania; 2. Division of Infectious Diseases, Department of Medicine, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania; 3. Division of Occupational Medicine, Department of Emergency Medicine, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania.

Address correspondence to Christopher Vinnard, MD, MPH, MSCE, Division of Infectious Diseases and HIV Medicine, Drexel University College of Medicine, 245 North 15th Street, MS 461, New College Building 6314, Philadelphia, PA 19102 (christopher.vinnard@drexelmed.edu).

Received May 17, 2012; accepted July 17, 2012; electronically published October 23, 2012.

 0899-823X/2012/3312-0015$15.00. DOI: 10.1086/668437

REFERENCES

1. Dooley SW Jr., Castro KG, Hutton MD, Mullan RJ, Polder JA, Snider DE Jr. Guidelines for preventing the transmission of tuberculosis in health-care facilities, with special focus on HIV-related issues. *MMWR Recomm Rep* 1990;39(RR-17):1–29.
2. Bangsberg DR, Crowley K, Moss A, Dobkin JF, McGregor C, Neu HC. Reduction in tuberculin skin-test conversions among medical house staff associated with improved tuberculosis infection control practices. *Infect Control Hosp Epidemiol* 1997;18:566–570.
3. Jensen PA, Lambert LA, Iademarco MF, Ridzon R. Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in healthcare settings, 2005. *MMWR Recomm Rep* 2005;54(RR-17):1–141.
4. Jasmer RM, Nahid P, Hopewell PC. Clinical practice. Latent tuberculosis infection. *N Engl J Med* 2002;347:1860–1866.
5. Joseph HA, Shrestha-Kuwahara R, Lowry D, et al. Factors influencing health care workers' adherence to work site tuber-

culosis screening and treatment policies. *Am J Infect Control* 2004;32:456–461.
6. Salazar-Schicchi J, Jedlovsky V, Ajayi A, Colson PW, Hirsch-Moverman Y, El-Sadr W. Physician attitudes regarding bacille Calmette-Guérin vaccination and treatment of latent tuberculosis infection. *Int J Tuberc Lung Dis* 2004;8:1443–1447.
7. Sahni R, Miranda C, Yen-Lieberman B, et al. Does the implementation of an interferon-gamma release assay in lieu of a tuberculin skin test increase acceptance of preventive therapy for latent tuberculosis among healthcare workers? *Infect Control Hosp Epidemiol* 2009;30:197–199.
8. Mancuso JD, Mazurek GH, Tribble D, et al. Discordance among commercially available diagnostics for latent tuberculosis infection. *Am J Respir Crit Care Med* 2012;185:427–434.
9. Sinkowitz RL, Fridkin SK, Manangan L, Wenger PN, Jarvis WR. Status of tuberculosis infection control programs at United States hospitals, 1989 to 1992. APIC. *Am J Infect Control* 1996; 24:226–234.
10. Villarino ME, Mazurek G. Tuberculosis contacts, concerns, and controls: what matters for healthcare workers? *Infect Control Hosp Epidemiol* 2006;27:433–435.