

CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Occupational Screening for Latent Tuberculosis: Clinical Utility, Cost-Effectiveness, and Guidelines

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About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada's health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.

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Research Questions

1. What is the clinical utility of serial testing for latent tuberculosis infection in people with a risk of occupational exposure to tuberculosis?
2. What is the cost-effectiveness of serial testing for latent tuberculosis infection in people with a risk of occupational exposure to tuberculosis?
3. What are the evidence-based guidelines regarding the testing for latent tuberculosis infection in people with a risk of occupational exposure to tuberculosis?

Key Findings

Two economic evaluations were identified regarding the cost-effectiveness of serial testing for latent tuberculosis infection in people with a risk of occupational exposure to tuberculosis. In addition, three evidence-based guidelines were identified regarding the testing for latent tuberculosis infection in people with a risk of occupational exposure to tuberculosis. No relevant clinical evidence was identified.

Methods

A limited literature search was conducted by an information specialist on key resources including Medline via Ovid, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were tuberculosis testing and occupational testing. No filters were applied to limit the retrieval by study type. The search was also limited to English language documents published between Jan 1, 2015 and Jun 1, 2020. Internet links were provided, where available.

This report is a component of a larger CADTH Condition Level Review on TB. A condition level review is an assessment that incorporates all aspects of a condition, from prevention, detection, treatment, and management. For more information on CADTH's Condition Level Review of TB, please visit the project page (<https://www.cadth.ca/tuberculosis>).

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	People with potential occupational exposure to tuberculosis (e.g., health care workers, staff in long term care facilities, staff in prisons)
Intervention	Serial testing for latent tuberculosis infection
Comparators	Q1-2: Testing for latent tuberculosis infection at baseline or post exposure; No testing for latent tuberculosis infection Q3: Not applicable
Outcomes	Q1: Clinical utility (e.g., latent tuberculosis infection, treatment for latent tuberculosis infection, tuberculin skin test conversion [i.e., results change from negative to positive], prevention of active tuberculosis infection, quality of life, adverse events) Q2: Cost-effectiveness (cost per health benefit) Q3: Recommendations regarding screening for latent tuberculosis in adults with potential occupational exposure to tuberculosis (e.g., baseline screening, serial screening, post-exposure screening)
Study Designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, economic evaluations, evidence-based guidelines

Results

Two economic evaluations^{1,2} were identified regarding the cost-effectiveness of serial testing for latent tuberculosis infection in people with a risk of occupational exposure to tuberculosis. In addition, three evidence-based guidelines³⁻⁵ were identified regarding the testing for latent tuberculosis infection in people with a risk of occupational exposure to tuberculosis. No relevant health technology assessments, systematic reviews, randomized controlled trials, or non-randomized studies were identified.

References of potential interest that did not meet the inclusion criteria are provided in the appendix.

Overall Summary of Findings

Two economic evaluations^{1,2} were identified regarding the cost-effectiveness of serial testing for latent tuberculosis infection (LTBI) in people with a risk of occupational exposure to tuberculosis. The authors of the first economic evaluation¹ found that screening new international hires and targeted triennial screening of existing high-risk workers was more cost-effective than annual universal screening in the context of an intermediate tuberculosis (TB)-burden country. Similarly, the authors of another economic evaluation² found that annual screening was less cost-effective in terms quality-adjusted survival compared to targeted or post-exposure screening of North American health care workers.

Three evidence-based guidelines³⁻⁵ were identified regarding the testing for LTBI in people with a risk of occupational exposure to tuberculosis. A summary of relevant recommendations is presented in Table 2. As part of the condition level review, the guidelines in this report were previously included in a CADTH report on guidelines for the identification of TB. The detailed critical appraisal of these guidelines can be found in that report.⁶

No relevant literature was found regarding the clinical utility of serial testing for LTBI in people with a risk of occupational exposure to tuberculosis; therefore, no summary can be provided.

Table 2: Summary of Relevant Recommendations

Summary of Recommendations	
Centers for Disease Control and Prevention, 2019³	
<p>Baseline screening:</p> <ul style="list-style-type: none"> All HCP should be screened, including a symptom evaluation and test (IGRA or TST) for those without documented prior TB disease or LTBI (page 440). HCP should undergo an individual TB risk assessment to guide interpretation of test results (page 440). <p>Post-exposure screening:</p> <ul style="list-style-type: none"> When an exposure is recognized, all HCP should be evaluated for symptoms (page 441). HCP with documented prior LTBI or TB disease do not need another test for infection after exposure (page 441). HCP with a baseline negative TB test and no prior TB disease or LTBI should be tested with either IGRA or TST when the exposure is identified (page 441). If that test is negative, another test should be conducted 8–10 weeks after the last exposure (page 441). <p>Serial screening and testing for health care personnel without LTBI:</p> <ul style="list-style-type: none"> Routine serial screening is not recommended (page 441). Screening can be considered for selected HCP groups at increased occupational risk of TB exposure (e.g., respiratory therapists) (page 441). 	
World Health Organization, 2018⁴	
	<ul style="list-style-type: none"> In countries with a low TB incidence, systematic LTBI testing may be considered for health workers (page 12). (Conditional recommendation, low–very low-quality evidence)
National Institute for Health and Care Excellence, 2016⁵	
<p>Baseline screening of new health care employees who are not new entrants from high-TB-incidence countries:</p> <ul style="list-style-type: none"> Employees who will be in contact with patients or clinical materials should be screened with TST if they have not had BCG vaccination (page 17). If the TST is positive, an IGRA should be conducted (page 17). <p>Baseline screening of new health care employees who are new entrants from high-TB-incidence countries:</p> <ul style="list-style-type: none"> Employees should be screened with TST (page 17). If the TST is positive, they should be assessed for active TB regardless of BCG history (page 17). If TST is unavailable, an IGRA should be conducted (page 17). <p>Post-exposure screening:</p> <ul style="list-style-type: none"> Health care employees who have had contact with patients in settings where TB is highly prevalent should be tested with IGRA (page 17). If the IGRA is positive, they should be assessed for active TB (page 17). 	

HCP = health care personnel; IGRA = interferon-gamma release assay; LTBI = latent tuberculosis infection; TB = tuberculosis; TST = tuberculin skin test

References Summarized

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-Analyses

No literature identified.

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

No literature identified.

Economic Evaluations

1. Png ME, Yoong J, Ong CWM, Fisher D, Bagdasarian N. A screening strategy for latent tuberculosis in healthcare workers: Cost-effectiveness and budget impact of universal versus targeted screening. *Infect Control Hosp Epidemiol*. 2019 03;40(3):341-349.
[PubMed: PM30786941](#)
2. Mullie GA, Schwartzman K, Zwerling A, N'Diaye DS. Revisiting annual screening for latent tuberculosis infection in healthcare workers: a cost-effectiveness analysis. *BMC Med*. 2017 05 17;15(1):104.
[PubMed: PM28514962](#)

Guidelines and Recommendations

3. Tuberculosis Screening, Testing, and Treatment of U.S. Health Care Personnel: Recommendations from the National Tuberculosis Controllers Association and CDC, 2019. *MMWR Morb Mortal Wkly Rep*. 2019 May 17; 68(19): 439–443.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6522077/>
See: Updated Recommendations, page 440
4. World Health Organization. Latent tuberculosis infection: updated and consolidated guidelines for programmatic management; 2018.
<https://apps.who.int/iris/bitstream/handle/10665/260233/9789241550239-eng.pdf?sequence=1&isAllowed=y> Accessed 2020 Jun 15.
See: 2.4 Other HIV-negative at-risk groups, page 12
5. The National Institute for Health and Care Excellence. Tuberculosis (NICE guideline no. NG33); 2016
<https://www.nice.org.uk/guidance/ng33/chapter/Recommendations#latent-tb> Accessed 2020 Jun 15.
See: 1.2.1 Diagnosing latent TB in adults, Healthcare workers, page 17

Appendix — Further Information

Previous CADTH Reports

6. CADTH. Identification of Tuberculosis: A Review of the Guidelines; 2020. <https://www.cadth.ca/identification-tuberculosis-review-guidelines> Accessed 2020 Jun 15.

Non-Randomized Studies

No Comparator

7. Dobler CC, Farah WH, Alsawas M, et al. Tuberculin Skin Test Conversions and Occupational Exposure Risk in US Healthcare Workers. *Clin Infect Dis*. 2018 02 10;66(5):706-711. [PubMed: PM29028965](#)
8. Park Y, Kim SY, Kim JW, et al. Serial testing of healthcare workers for latent tuberculosis infection and long-term follow up for development of active tuberculosis. *PLoS ONE*. 2018;13(9):e0204035. [PubMed: PM30235272](#)

Economic Evaluations – Unclear Methodology

9. Coppeta L, Somma G, Baldi S, et al. Cost-Effectiveness of Annual Screening for Tuberculosis among Italian Healthcare Workers: A Retrospective Study. *Int J Environ Res Public Health*. 2020 03 05;17(5):05. [PubMed: PM32150923](#)

Clinical Practice Guidelines – Unclear Methodology

10. Windsor-Essex County Health Unit. Long-Term Care and Retirement Homes: Recommendations for Tuberculosis (TB) Screening; 2020. Accessed 2020 Jun 15. <https://www.wechu.org/tuberculosis-tb-management/long-term-care-and-retirement-homes-recommendations-tuberculosis-tb>
See: Employees and volunteers
11. BC Centre for Disease Control. Communicable Disease Control Manual Chapter 4: Tuberculosis. TB Screening and Testing; 2019. Accessed 2020 Jun 15. <http://www.bccdc.ca/resource-gallery/Documents/Communicable-Disease-Manual/Chapter%204%20-%20TB/4.0a%20TB%20Screening%20and%20Testing.pdf>
See: Two Step TST – Background and Indications, page 6
12. Government of New Brunswick. Tuberculosis testing recommendations update [Internet]. Fredericton, NB: Government of New Brunswick; 2016. Available from: <https://www2.gnb.ca/content/dam/gnb/Departments/h-s/pdf/en/CDC/TuberculosisTestingRecommendationsUpdate.pdf> Accessed 2020 Jun 15.

13. PEI Health and Wellness. Tuberculin Skin Testing Policy; 2016. Accessed 2020 Jun 15. https://www.princeedwardisland.ca/sites/default/files/publications/tuberculin_skin_testing_policy_web.pdf
See: 6.1 Client Assessment; 6.3 Two Step TST
14. Middlesex-London Health Unit. Tuberculosis Screening: Long-Term Care and Retirement Homes; 2015. <https://www.healthunit.com/tb-admission-screening> Accessed 2020 Jun 15.
See: Staff and volunteers
15. Government of Newfoundland and Labrador. Guideline for preventing the transmission of Mycobacterium tuberculosis across the continuum of care [Internet]. St. John's, NL: Government of Newfoundland and Labrador; 2015. https://www.health.gov.nl.ca/health/publichealth/cdc/tuberculosis_management.pdf
Accessed 2020 Jun 15.
See: Section 8: Occupational Health, Screening, page 58
16. Toronto Public Health. Recommendations for Tuberculosis (TB) Screening in Long Term Care and Retirement Homes; 2015. <https://www.toronto.ca/wp-content/uploads/2017/10/97c4-tph-tb-screening-long-term-care-and-retirement-homes-10-2015.pdf> Accessed 2020 Jun 15.
See: page 2

Review Articles

17. Mok JH. Diagnosis and Treatment of Latent Tuberculosis Infection in Healthcare Workers. *Tuberc Respir Dis (Seoul)*. 2016 Jul;79(3):127-133.
[PubMed: PM27433172](#)

Additional References

18. Iowa Department of Public Health. TB Prevention & Control for Homeless Shelters; 2020. <https://idph.iowa.gov/immmtb/tb/homeless> Accessed 2020 Jun 15.
See: TB Screening/Testing for Homeless Shelters, Staff
19. City of Toronto. Workplace Screening Recommendations for Tuberculosis (TB); 2020. <https://www.toronto.ca/community-people/health-wellness-care/health-programs-advice/tuberculosis-tb/workplace-screening-recommendations-for-tuberculosis-tb/>
Accessed 2020 Jun 15.
See: Daycares
20. New York State. Corrections and Community Supervision. Tuberculosis control program; 2019. <https://doccs.ny.gov/system/files/documents/2019/08/4322%20%20Tuberculosis%20Control%20Program.pdf> Accessed 2020 Jun 15.
See: Section V: Tuberculosis Screening Program, page 4
21. Ontario Hospital Association. Tuberculosis Surveillance Protocol for Ontario Hospitals; 2018. Accessed 2020 Jun 15. [https://www.oha.com/Documents/Tuberculosis%20Protocol%20\(June%202018\).pdf](https://www.oha.com/Documents/Tuberculosis%20Protocol%20(June%202018).pdf)
22. Seattle-King County TB Control Guidelines for Homeless Service Agencies. Tuberculosis Education, Training & Screening for Agency Staff, Volunteers and Clients; 2018. Accessed 2020 Jun 15.

<https://www.kingcounty.gov/depts/health/locations/homeless-health/healthcare-for-the-homeless/-/media/depts/health/communicable-diseases/documents/tuberculosis/TB-education-training-screening.ashx>

See: Recommended Screening for Homeless Agency Staff & Volunteers, page 2

23. City of Toronto. Immunization and Tuberculin Screening for all persons working in Child Care Centres; 2017. Accessed 2020 Jun 15.

<https://www.toronto.ca/wp-content/uploads/2017/10/96a3-tph-immunization-tuberculin-screening-employees-child-care-centres-2017-10-10.pdf>

See: Tuberculosis Screening, page 1