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SUMMARY WITH CRITICAL APPRAISAL

Chest X-Rays Around Placement in Long-Term Care Facilities: A Review of Clinical Utility and Guidelines

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Abbreviations

IGRA	interferon gamma release assay
LTC	long-term care
LTBI	latent tuberculosis infection
TB	tuberculosis
TST	tuberculin skin test

Context and Policy Issues

In 2010, the rate of tuberculosis (TB) fell to 4.6 per 100,000 population in Canada, which was an all-time low, with 1,577 cases being reported.¹ While the rate of TB has continued to decrease in Canada over time, some groups of the population have higher rates of infection than others, one of which is older adults.¹ For example, in 2010, when looking at rates according to age and sex, males over the age of 75 had the one of the highest TB rates at 13.6 per 100,000 population.¹ Those who reside in long-term care facilities are generally considered to have the same risk of TB as community-dwelling populations, except for those that belong to at-risk groups, in particular elderly males.¹

Mycobacterium tuberculosis is the bacteria that causes TB infection.¹ Following infection, approximately 5% of individuals will develop early primary disease, however, the majority of individuals will not display symptoms of infection but will develop a latent TB infection (LTBI) in which the bacteria remain in dormant state in the lungs which can be reactivated and become active disease in the future.¹ Approximately, 90% of those infected with TB will develop a latent TB infection (LTBI) that is not reactivated, and approximately 5% will experience a reactivation of a LTBI (if the LTBI is not identified and left untreated).¹ Most TB cases that are identified in the Canadian population are considered to be reactivations that occur between 18 and 24 months following the initial infection.¹

Screening for LTBI may be used to identify people who are at risk of reactivation due to associated conditions such as compromised immunity^{1,2} and would therefore benefit from treatment.¹ Chest radiography (i.e., a chest x-ray) can be used to identify lesions in the lung, referred to as Ghon focus (a calcified granuloma in the lung) that occur with an initial, active TB infection. Other screening tests, such as the tuberculin skin test (TST) and the interferon gamma release assay (IGRA) may be used to detect LTBI. However, a positive screening test for LTBI may still require follow-up with a chest x-ray rule out subclinical active TB since TST and IGRAs do not distinguish between LTBI and active TB disease.¹ Moreover, TST may be difficult to interpret in older adults due to immune suppression.¹ Thus, a two stage test may be used in this population.¹

Because older adults are at higher risk for TB, a chest x-ray is required prior to placement in long-term care in some provinces and jurisdictions to identify individuals with potential active TB disease so that they can be appropriately treated prior to admission when feasible.¹ However, this requirement does not appear to be universal.

This report will review the evidence, if identified, in which the clinical utility of chest x-rays for the assessment of illness (e.g., TB or other respiratory illness such as pneumonia) in adults prior to placement in long-term care facilities was evaluated. As well, guidelines pertaining to the use of assessments for illness in adults, including chest x-rays and other medical assessments, prior to being placed in long-term care facilities will be summarized and reviewed.

Research Questions

1. What is the clinical utility of chest x-rays for the assessment of illness in adults prior to being placed or having been placed in long-term care facilities?
2. What are the evidence-based guidelines associated with assessments for illness in adults prior to being placed or having been placed in long-term care facilities?

Key Findings

No evidence that evaluated the clinical utility of chest x-rays for the assessment of illness in adults prior to being placed or having been placed in long-term care facilities was identified. One evidence-based guideline from the Public Health Agency of Canada was identified that met the inclusion criteria for the report. It is recommended that adults over the age of 65 from certain higher risk groups receive chest x-rays prior to admission to long-term care to screen for active tuberculosis and that individuals aged 65 and under from those higher risk group be screened for latent tuberculosis infection with a two-step tuberculin skin test. However, the level of evidence and strength of recommendation was not included for these recommendations.

Methods

Literature Search Methods

A limited literature search was conducted on key resources including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases and a focused Internet search. No methodological filters were applied to limit retrieval by publication type. The search was limited to English language documents published between January 1, 2007 and March 6, 2018.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Adults being assessed prior to placement in residential (group) care/long-term care facilities or having been placed in a residential (group) care/long-term care facilities.
Intervention	Q1: Chest x-ray as an assessment for illness (e.g., but not limited to tuberculosis, pneumonia) Q2: Chest x-ray or other medical assessments prior to entering a long term care facility
Comparator	Q1: Other medical exams to assess illness (for tuberculosis and other illnesses); No x-ray; No assessment; Q2: No comparator
Outcomes	Q1: Clinical utility (e.g., but not limited to, infection to other patients, infection control, tracking patient baseline tuberculosis) Q2: Guidelines (e.g., are there any other assessments/practices in place for medical illness assessment prior to entering these types of facilities, timing of test [chest x-ray or other medical assessments] prior to placement)
Study Designs	Health technology assessments (HTA), systematic reviews (SR), meta-analyses (MA), randomized controlled trials (RCTs), non-RCTs.

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 2007. Guidelines with unclear methodology were also excluded.

Critical Appraisal of Individual Studies

The included guidelines were assessed with the AGREE II instrument.³ Summary scores were not calculated for the included studies; rather, a review of the strengths and limitations of the guideline was described narratively.

Summary of Evidence

Quantity of Research Available

A total of 281 citations were identified in the literature search. Following screening of titles and abstracts, 260 citations were excluded and 21 potentially relevant reports from the electronic search were retrieved for full-text review. Five potentially relevant publications were retrieved from the grey literature search. Of these potentially relevant articles, 25 publications were excluded for various reasons, and one publication met the inclusion criteria and was included in this report. This was one evidence-based guideline. Appendix 1 presents the PRISMA flowchart of the study selection.

Additional references of potential interest are provided in Appendix 5.

Summary of Study Characteristics

Details of the included guideline characteristics are found in Appendix 2, Table 2.

Study Design

One guideline was included from the Public Health Agency of Canada.¹ The target users were public health and clinical professionals and it addressed a wide range of topics related

to TB including screening, contact management, and treatment of active and latent infections. Minimal information was provided with respect to the guideline development process although it was stated that recommendations were based on review of the literature and the quality of evidence was rated.¹ The approach to recommendation formulation was not reported.¹

Country of Origin

The included guideline was developed in Canada and intended to apply to the Canadian population.¹

Patient Population

The included guideline made recommendations specific to individuals who were preparing to move into LTC facilities.¹

Interventions and Comparators

The included guideline made recommendations regarding the use of chest x-rays and TST prior to admission to LTC facilities.¹ Numerous other recommendations were made, but were not relevant to this report.

Summary of Critical Appraisal

Additional details regarding the strengths and limitations of the included publication are provided in Appendix 3, Table 3.

The included guideline reported minimal details about the methodology used in its development. While it is stated that the literature was identified through review and then synthesized to make recommendations, no details were provided about those processes. While the rating system for the included literature and the strength of recommendations is presented, no details are provided for the processes used to arrive at those ratings. Further, the strength of recommendation was not applied to all recommendations. This is particularly important because the recommendations relevant to this report were among those that were not rated. As such the quality of the evidence to support the recommendation is unknown, as is the confidence of the guideline committee itself in the recommendations.¹ This makes it more challenging for decision makers to interpret the recommendations.

Strengths of the included guideline were that the intended target users were clear and that the guideline development process included individuals from a broad range of disciplines, agencies, and expert bodies such as the Canadian Thoracic Society, Public Health Agency of Canada, Medical Microbiology and Infectious Diseases, Laboratory Medicine and Pathobiology, Occupational Health Nurse, Medical Officer of Health, Pediatric Infectious Diseases, Institute of Aboriginal Peoples' Health, and British Columbia Centre for Disease Control.¹

Summary of Findings

1. *What is the clinical utility of chest x-rays for the assessment of illness in adults prior to being placed or having been placed in long-term care facilities?*

No relevant literature was identified in the literature search.

2. *What are the evidence-based guidelines associated with assessments for illness in adults prior to being placed or having been placed in long-term care facilities?*

Based on the included guideline,¹ chest x-rays are recommended prior to admission to LTC to screen for active TB only for those over the age of 65, as outlined in Appendix 4, Table 3. It is recommended that individuals aged 65 and under who are members of a risk group for LTBI undergo screening for LTBI with a two-step TST.¹ There were no associated strength of recommendations. It should be noted, however, that these recommendations appeared to be applicable only to “*identified populations*” who were higher risk populations as outlined Table 3 (e.g. Aboriginal Canadians residing in communities with high TB rates, people infected with HIV, the urban poor and individuals with chronic renal failure requiring hemodialysis), not the entire Canadian population. The full list of identified populations can be found in Table 4.

Limitations

There was no literature identified that addressed the clinical utility of chest x-rays for the assessment of illness in adults prior to being placed or having been placed in LTC facilities. As such, there is an evidence gap for this question.

One guideline was identified that addressed assessments for illness in adults prior to being placed or having been placed in long-term care facilities.¹ While this was a Canadian guideline developed with consultation from a wide range of Canadian experts and reviewed externally, its methodology was unclear to some extent and the recommendations that were relevant to the questions in this report did not contain clear link to the evidence base and the strength of recommendation was not reported. As such, it remains unclear to some degree if the recommendations were based off of expert consensus or were supported by evidence from the literature. Only guidelines related to TB screening were identified. No guidelines related to other illnesses were identified.

Conclusions and Implications for Decision or Policy Making

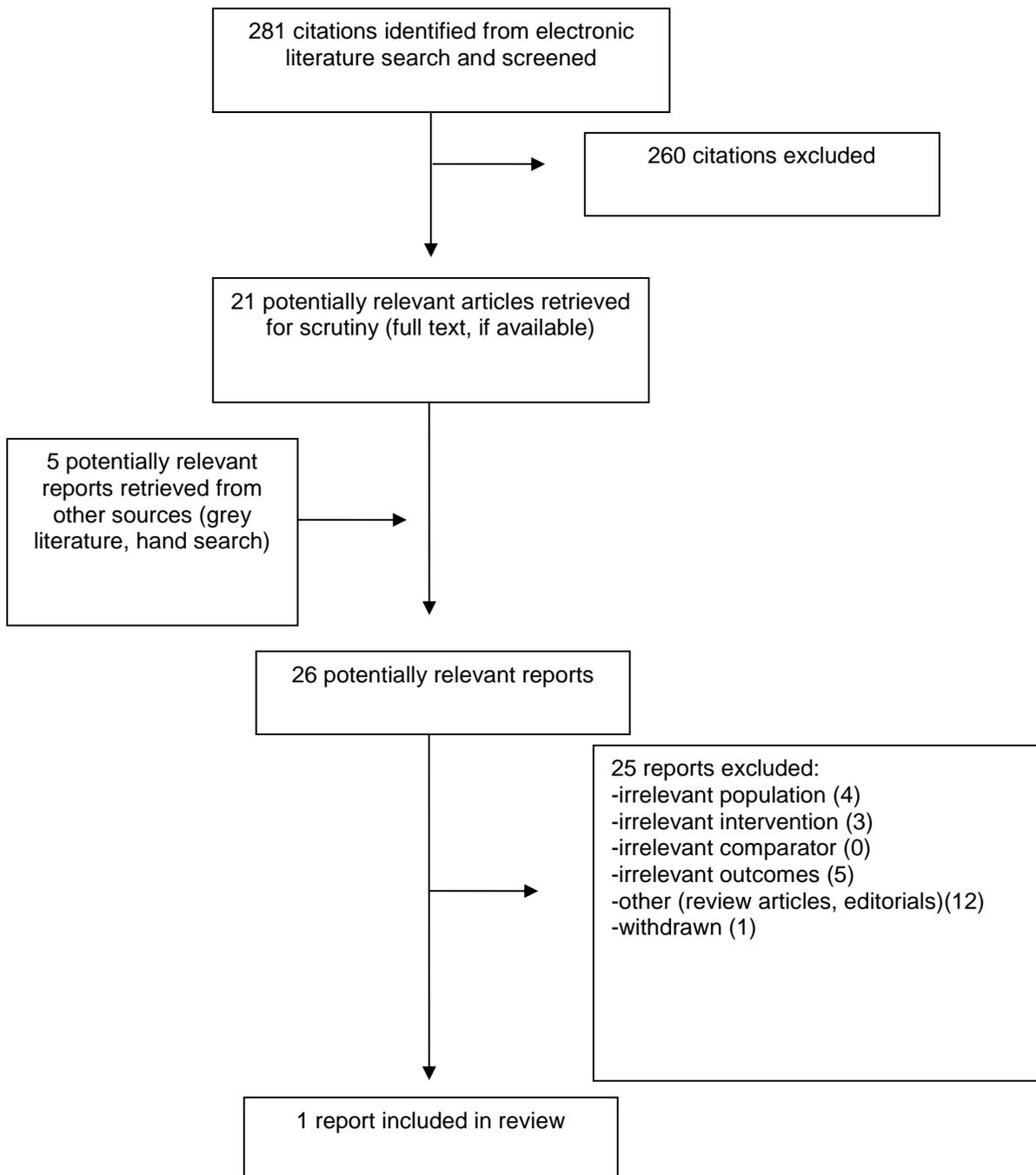
There was no literature identified that addressed the clinical utility of chest x-rays for the assessment of illness in adults prior to being placed or having been placed in LTC facilities. As such, no conclusions can be made regarding this question. Given the evidence gap, this may be a question that should be addressed with future research.

One guideline was identified that addressed assessments for illness in adults prior to being placed or having been placed in long-term care facilities. This guideline recommended that adults over the age of 65 from certain higher risk groups receive chest x-rays prior to admission to LTC to screen for active TB and that individuals aged 65 and under from those higher risk group be screened for LTBI with a two-step TST.¹

References

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2. Richards MJ, Stuart RL. Principles of infection control in long-term care facilities. In: Post TW, editor. UpToDate [Internet]. Waltham (MA): UpToDate; 2017 Sep 26 [cited 2018 Mar 26]. Available from: <https://www.uptodate.com/contents/principles-of-infection-control-in-long-term-care-facilities> Subscription required.
3. Brouwers M, Kho ME, Browman GP, Burgers JS, Cluzeau F, Feder G, et al. AGREE II: advancing guideline development, reporting and evaluation in healthcare. CMAJ [Internet]. 2010 Dec;182(18):E839-E842. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3001530/pdf/182e839.pdf>

Appendix 1: Selection of Included Studies



Appendix 2: Characteristics of Included Publications

Table 2: Characteristics of Included Guideline

Intended Users, Target Population	Intervention and Practice Considered	Major Outcomes Considered	Evidence Collection, Selection, and Synthesis	Evidence Quality Assessment	Recommendations Development and Evaluation	Guideline Validation
Public Health Agency of Canada, 2014¹						
Public health and clinical professionals. Canadian population	Screening for active TB and LBTI with chest x-rays and TST prior to admission to LTC facilities.	The guideline was extensive and provided standards for screening for TB, contact management and treatment.	A literature review was used to identify the body of evidence, but the methodology was unclear with respect to collection, selection and synthesis.	The evidence was rated strong through very weak based upon the study design, consistency between study results and generalizability of the findings.	“The authors of each chapter reviewed all published evidence, particularly the most recent studies, and synthesized and rated this evidence.”p.3 Some, but not all, recommendations were rated as strong or conditional based upon the balance between desirable effects and undesirable effects, and level of evidence. However, the method for arriving at the recommendation was not reported.	The guideline was reviewed externally by a number of experts from different disciplines.

LTC=Long-term care; LTBI=latent tuberculosis infection; TB=tuberculosis; TST=tuberculin skin test

Appendix 3: Critical Appraisal of Included Publications

Table 3: Strengths and Limitations of Guidelines using AGREE II³

Item	Guideline Public Health Agency of Canada, 2014¹
Domain 1: Scope and Purpose	
1. The overall objective(s) of the guideline is (are) specifically described.	The overall objective and purpose of the guideline is stated.
2. The health question(s) covered by the guideline is (are) specifically described.	The questions addressed in the guideline are not individually described.
3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.	The population to whom the guideline is meant to apply is specifically described: to public health and clinical professionals, not individual patient management.
Domain 2: Stakeholder Involvement	
4. The guideline development group includes individuals from all relevant professional groups.	Yes- Cross Canadian representation with many disciplines and agencies being included such as: Canadian Thoracic Society, Public Health Agency of Canada, Medical Microbiology and Infectious Diseases, Laboratory Medicine and Pathobiology, Occupational Health Nurse, Medical Officer of Health, Pediatric Infectious Diseases, Institute of Aboriginal Peoples' Health, and British Columbia Centre for Disease Control.
5. The views and preferences of the target population (patients, public, etc.) have been sought.	Unclear
6. The target users of the guideline are clearly defined.	Target users are clearly defined. The guideline is intended to provide information to public health and clinical professionals.
Domain 3: Rigour of Development	
7. Systematic methods were used to search for evidence.	Stated that a literature was conducted but methods unclear.
8. The criteria for selecting the evidence are clearly described.	Not described.
9. The strengths and limitations of the body of evidence are clearly described.	Not described.
10. The methods for formulating the recommendations are clearly described.	Not described.
11. The health benefits, side effects, and risks have been considered in formulating the recommendations.	Not described.
12. There is an explicit link between the recommendations and the supporting evidence.	The evidence link is clear for some, but not all recommendations.
13. The guideline has been externally reviewed by experts prior to its publication.	Yes, the guideline was reviewed by experts.
14. A procedure for updating the guideline is provided.	Not described.
Domain 4: Clarity of Presentation	
15. The recommendations are specific and unambiguous.	Some recommendations are clear but others are not as specific and refer back to other sections of the document which is cumbersome to follow.

Table 3: Strengths and Limitations of Guidelines using AGREE II³

Item	Guideline
16. The different options for management of the condition or health issue are clearly presented.	Clear presentation for some recommendations but not necessarily for those relevant for this report as they refer back to other sections of the document.
17. Key recommendations are easily identifiable.	Some key recommendations are easily identifiable but not necessarily for those relevant for this report as they refer back to other sections of the document.
Domain 5: Applicability	
18. The guideline describes facilitators and barriers to its application.	Not described.
19. The guideline provides advice and/or tools on how the recommendations can be put into practice.	Not provided.
20. The potential resource implications of applying the recommendations have been considered.	Not considered
21. The guideline presents monitoring and/or auditing criteria.	Not presented
Domain 6: Editorial Independence	
22. The views of the funding body have not influenced the content of the guideline.	Unclear.
23. Competing interests of guideline development group members have been recorded and addressed.	Competing interests have not been recorded.

Appendix 5: Additional References of Potential Interest

Guidelines with No Recommendations with Respect to Timing

National Guideline Clearinghouse. Guideline summary: final recommendation statement: latent tuberculosis infection: screening. In: National Guideline Clearinghouse [Internet]. Rockville (MD): Agency for Healthcare Research and Quality; 2016 Sep [cited 2018 Apr 4]. Available from: <https://www.guideline.gov/summaries/summary/50475/final-recommendation-statement-latent-tuberculosis-infection-screening?q=tuberculosis+diagnosis>

Recommendations or Requirements without Methodology Presented

Long-term care and retirement homes: recommendations for tuberculosis (TB) screening [Internet]. Windsor (ON): Health Unit, Windsor Essex County; 2017. [cited 2017 Dec 7]. Available from: <https://www.wechu.org/tuberculosis-tb-management/long-term-care-and-retirement-homes-recommendations-tuberculosis-tb>

TB screening requirements for long term care/retirement home residents [Internet]. Waterloo (ON): Public Health and Emergency Services, Region of Waterloo; [n.d.]. [cited 2017 Dec 7]. Available from: http://chd.region.waterloo.on.ca/en/clinicsClassesFairs/resources/TBScreening_NewLTCResidents.pdf

Recommendations for tuberculosis (TB) screening in long term care and retirement homes [Internet]. Bellville (ON): Health Unit, Hastings & Prince Edward Counties; 2014 Jul. [cited 2017 Dec 7]. Available from: http://hpepublichealth.ca/sites/default/files/documents/for-professionals/CDC_RecommendationsforTBScreeninginLTCandRHs.pdf