UK Health Security Agency

Effectiveness of methods to identify people infected with tuberculosis or people with active tuberculosis disease in prisons and places of detention

A rapid systematic review

Contents

Main messages

1. This rapid systematic review (search up to 3 July 2024) identified and summarised evidence relating to the effectiveness of methods to identify people infected with tuberculosis (TB) or people with active TB disease in prisons and places of detention in low and moderate incidence countries. Low and moderate incidence countries were defined as those with a TB incidence of less than 40 cases per 100,000 people. In total, 6 studies were included, all of which were conducted in prisons (1 to 6).

2. In this review, the term ‘active case finding’ was defined as any method to diagnose latent TB infection or active TB disease. Passive case finding was defined as detection of TB in people who self-refer with symptoms suggestive of TB. The case finding methods identified in this review included chest X-ray (CXR), tuberculin skin test (TST), Interferon Gamma Release Assay (IGRA), sputum polymerase chain reaction (PCR), and a symptom based case finding protocol. No studies evaluated methods to identify non-respiratory TB.

3. Measures of effectiveness of active case finding identified in this review included diagnostic accuracy (1), and economic evaluations of effectiveness, (of which 4 were based on economic models (2 to 5) and one was an economic evaluation without a model (6)). No studies were identified that included other measures of effectiveness listed in the review protocol.

4. Three studies evaluated the effectiveness of TST in comparison to CXR for detection of active respiratory TB (1, 3, 6). Compared to CXR, TST had a sensitivity of 35.6% and a specificity of 73.9% (1). Two economic evaluations reported that CXR was more cost-effective than TST (3, 6). These findings support that TST should not be used for diagnosis of active TB.

5. One study compared IGRA to TST for detection of latent TB infection (LTBI) (2). Overall, IGRA was $786.73 cheaper than TST per LTBI case identified (based on 2013 prices).

6. Two economic evaluations indicated that IGRA was the most cost-effective case finding strategy for TB infection (both latent and active TB) when compared to self-referral, CXR only, TST, or combinations of TST and IGRA (4, 5). These studies used CXR to confirm active respiratory TB disease following a positive IGRA result.

7. Critical appraisal highlighted several potential limitations of the included evidence. The study with information on diagnostic accuracy was at risk of bias as not all people received the reference standard. Economic evaluations often reported limited detail, with only one study using quality-adjusted life years (QALYs). The studies were not conducted in the UK, and therefore may have limited generalisability to UK healthcare costs.

8. Limited evidence was found for the effectiveness of active case-finding in prisons and places of detention in low and moderate incidence countries. There was only a small number of studies, which were mostly economic evaluations with limited detail on effectiveness, all in adult prisons, and none in the UK. Due to differences in case-finding strategies and reference tests across studies, the findings are not directly comparable between studies, however the evidence offers some insights into the accuracy and cost-effectiveness of active case-finding for TB.

9. Overall, CXR was reported to have better diagnostic accuracy and be more cost-effective than TST for detection of active respiratory TB. Evidence for effectiveness of LTBI case finding was limited to one study that only reported IGRA to cost less per case identified compared to TST. For case finding of TB infection (both latent and active respiratory TB) upon admission into prisons in studies, evidence suggested IGRA may be more cost-effective than TST, TST followed by IGRA, and CXR (with CXR used to confirm active respiratory TB for IGRA positive cases). These findings should be interpreted with caution, considering the identified limitations in the evidence.

Purpose

The purpose of this rapid systematic review was to identify and summarise evidence relating to the effectiveness of methods to identify people infected with tuberculosis (TB) or people with active TB disease in prisons and places of detention within countries with a low or moderate TB incidence. In this review, the term ‘active case finding’ was defined as any method to diagnose latent TB infection or active TB disease.

The research question was:

1. What are the effective strategies of case finding for tuberculosis (TB) in prisons and places of detention?

Methods

A rapid systematic review was conducted, following streamlined systematic methods to accelerate the review process. A literature search was undertaken to look for relevant studies, published or available as preprint, up to 3 July 2024.

Only studies in populations from countries or territories with low or moderate TB incidence (estimated incidence rate of less than 40 per 100,000 in 2022) and studies examining prison residents and detainees were included. Studies that only included staff or visitors to prisons and places of detention were excluded.

Case finding could be undertaken either at entry or during a stay in the prison or place of detention. The outcomes of relevance included are available in Table A1. These included sensitivity, specificity, and cost-effectiveness of case finding strategies. Prisons and places of detention included adult prisons, foreign national prisons, immigration removal centres, children and young people secure estates, and approved premises (residential facilities to support individuals released from prisons or under supervision in the community).

Screening on title and abstract was undertaken in duplicate by 2 reviewers for 20% of the eligible studies, with the remainder completed by one reviewer. Screening on full text was undertaken by one reviewer and checked by a second. Data extraction was performed by one reviewer and checked by a second. Relevant guidelines were searched by one reviewer for any additional studies that were relevant for inclusion in this review. Studies used to select model parameters in the included economic evaluations were also searched for any additional primary studies.

Critical appraisal was conducted in duplicate by 2 reviewers. A protocol was produced before the literature search was conducted, including the review question, the eligibility criteria, and all other methods. Full details of the methodology are provided in the protocol in Annexe A. There were 2 deviations from the protocol:

1. The National Institute for Health and Care Excellence (NICE) appraisal checklist for economic evaluations and the Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) tool were used to assess risk of bias for economic evaluations and diagnostic studies respectively.

2. The World Health Organization (WHO) estimates of TB incidence reported on GOV.UK (7) were used to determine eligibility for inclusion during screening of studies. This list was withdrawn during the review, therefore the included studies were checked against the Global TB Programme website data to verify TB incidence (8).

The NICE appraisal checklist for economic evaluations assesses both applicability and study limitations (9). Where studies did not conduct full cost-effectiveness models, this checklist was still applied to assess risk of bias, as the most applicable available tool.

The QUADAS-2 tool assesses 4 domains that could introduce bias into the studies, including bias from selection of cases, bias from the conduct or interpretation of the case finding strategy being evaluated (the index test), bias from the reference case finding strategy, its conduct, or its interpretation, and bias from the patient flow (10). There is no overall risk of bias rating from the QUADAS-2 tool, so the domains that were considered high risk for each study are presented with the study description and results.

Glossary of terms

This review includes specific terminology relating to TB, cost-effectiveness and diagnostic accuracy evaluations. These terms are defined below to help with interpretation of the review's findings.

Dominated: in economic evaluations, an intervention that is both more expensive and less effective than another option.

Incremental cost-effectiveness ratio (ICER): a measure of the cost-effectiveness of a healthcare intervention by comparing the additional cost to the additional health benefit it provides, (often expressed in terms of cost per number of QALYs gained).

Index test: a case finding strategy being evaluated for its accuracy or effectiveness in comparison to a reference standard.

Quality-adjusted life year (QALY): is a measure that combines the length and quality of life into a single value, with one QALY representing one year of life in perfect health. It is used to evaluate the effectiveness of interventions by considering both how long they extend life and how much they improve its quality.

Reference standard: a standard test used to evaluate the accuracy of another test by comparison assumed to have perfect sensitivity and specificity.

Sensitivity: the proportion of people with the disease correctly identified.

Specificity: the proportion of people without the disease correctly identified.

TB infection: a person exposed to TB with immunological evidence of infection but who is well.

TB disease: a person infected with TB who has signs and or symptoms of disease.

Willingness to pay threshold: the maximum amount an individual or society is prepared to spend to gain a specific health benefit, such as an additional QALY, used to determine whether an intervention is considered cost-effective.

Evidence

In total, 4,883 primary studies were screened at title and abstract and 70 studies were screened at full text. Of these, 6 studies met the inclusion criteria (1 to 6). A PRISMA diagram showing the flow of studies through the review is shown in Annexe B, and studies excluded on full text screening are available with the reasons why in Annexe C. Three studies were excluded because they compared accuracy of different nucleic acid amplification tests to one another using different reference standards, and therefore the diagnostic accuracy could not be combined or compared to other case finding strategies (11 to 13). Study characteristics are available in Annexe D, and risk of bias assessments are available in Annexe E.

One study reported on the effectiveness of active case finding for detection of latent TB infection (LTBI) (2), 3 for detection of active TB (1, 3, 6), and 2 studies reported on the effectiveness of case finding for TB on admission to prison (without specifying whether this was for LTBI or active TB) (4, 5).

One study presented enough information to calculate sensitivity and specificity of TST compared to CXR (1). Four studies were economic evaluations of case finding strategies that used economic models (2 to 5) and one reported costs per active TB case identified for 2 case finding strategies without an economic model (6). No studies reported on other outcomes pre-specified in the protocol.

Sensitivity and specificity of TB case finding

One study presented enough information to estimate the sensitivity and specificity of TST compared to CXR for active TB case finding (1). Study characteristics are presented in Table D.1.

Bellin and others tested 1,314 residents (no information on age or sex) who were newly admitted to an opiate detoxification unit of a prison in the USA for active respiratory TB with TST and CXR, between July 1991 and January 1992 (1). In order to enable estimation of sensitivity and specificity of TST in this report, CXR was taken as the reference standard. CXR was selected as the reference standard as CXR is recommended for the detection of active TB (TST is not), and the study did not report any other case finding methods. The test results were:

- TST negative, CXR negative: 917 (69.8%)
- TST negative, CXR positive: 47 (3.6%)
- TST positive, CXR negative: 324 (24.7%)
- TST positive, CXR positive: 26 (2.0%)

Based on these results, the calculated sensitivity and specificity values (not reported by study) were:

- sensitivity of TST for active respiratory TB: 35.6%
- specificity of TST for active respiratory TB: 73.9%

Critical appraisal found that only 62% of those with TST results also had CXRs (the reference standard in this analysis), which may have introduced bias if the reasons for this were not random.

Economic evaluations

Four studies reported economic models for active case finding (2 to 5). Three models estimated the cost per TB case identified (2 to 4), while one study estimated the cost per QALY gained (5). A further economic evaluation reported cost-per case of active TB identified (6). Study characteristics are presented in Table D.2.

The economic modelling studies used information from published studies, government sources, or conducted primary studies to estimate values that compared different case finding strategies. The economic models all included estimates of healthcare costs of the case finding strategies, and usually effectiveness based on diagnosis, treatment, and hospitalisation due to TB. The studies reporting the values used in the models (for example sensitivity and specificity) were checked for relevance to include in this review, however none were relevant to include as they were not specific to prison populations. Case finding strategies for each of these 5 studies are presented in this review in the order in which they were analysed in the models.

Economic evaluation of case finding strategies for LTBI

Nijhawan and others modelled the cost and effectiveness of TST and IGRA as case finding strategies for LTBI at prison admission to Dallas County Jail in the USA (2).

Model parameters were taken from a sample of 529 residents who received TST and IGRA tests. Costs were based on 2013 prices and given in USA dollars.

Total costs of each LTBI case identified included the costs of case finding, human resource costs, and clinical and laboratory costs. Over a one year period, IGRA was $786.73 cheaper than TST per LTBI case identified (TST cost $1,246.60 per LTBI case identified, IGRA cost $459.87 per LTBI case identified).

Critical appraisal found this study to have potentially serious limitations. The data was only modelled over a one-year period, discounted future costs were not calculated and QALYs were not estimated. As the study was conducted in the USA, the findings may not be applicable to the UK. Assumptions about sensitivity and specificity of TST and IGRA were not reported, nor

were the probability of secondary transmission, or TB prevalence in the prison population. Sensitivity and specificity of the tests was not calculated as neither test could be assumed to be an appropriate reference standard.

Economic evaluations of case-finding strategies for active TB

Degner and others observed all residents in a prison (maximum of 5,000 at one time, average of 92,517 residents per year) in the USA between 2002 and 2014 (6). All new residents completed a health questionnaire and physical examination, including recording symptoms of TB (fever, chronic cough, or weight loss). If the resident had potential symptoms of active TB, they received a CXR and provided sputum for culture, and were isolated until treatment completion or confirmation they did not have TB. Additional TB case finding depended on the year, that is:

- between 2002 and 2007, TST performed, which if positive led to a CXR and further examination:
  - if CXR was positive, this led to a diagnosis of active TB, isolation and treatment
  - if CXR was negative, this led to a diagnosis of latent TB and standard treatment

- between 2008 to 2014, CXR performed, which:
  - if positive (and a health questionnaire was positive), led to isolation and treatment
  - if negative (but there were symptoms of TB), this led to TST and then 3 serial sputum acid-fast bacillus tests, to confirm if active TB or LTBI TB was present (the study did not report if or how potential evidence of TB outside of CXR was followed up)

During 2002 and 2007, 8 active TB cases were detected (1.3 cases per year, 26.7 cases per 100,000 person-years), and during 2008 and 2014, 37 active TB cases were detected (5.3 cases per year, 105.7 cases per 100,000 person-years). Totals costs, given in 2014 USD, included the costs of case finding interventions in exposed contacts and treatment costs for LTBI.

Overall cost per case of active TB identified was estimated to be $5,850.78 for TST (during the 2002 to 2007 period) and $399.11 for CXR (during the 2008 to 2014 period).

Critical appraisal found this study to have minor limitations. The study authors did not calculate discounted future costs but instead directly observed costs in the study period, and QALYs were not estimated. As the study was conducted in the USA, the findings may not be applicable to the UK setting.

Jones and others conducted a cost-effectiveness study which modelled the cost of identifying active TB cases using 3 different case finding strategies at prison admission in the USA (3). The case finding strategies for active TB were:

1. CXR
2. TST
3. Symptom questionnaire

Economic model parameters were taken from published literature, based on 2009 prices, and given in US dollars. Costs included the cost of case finding and evaluation as well as both inpatient and outpatient treatment. Each case of active TB detected through case finding at admission was assumed to halve the number of infected contacts and future cases of active disease compared to passive case finding.

The incidence of active TB in this modelled prison population was assumed by the study to be 68 per 100,000, and the proportion of active TB cases with multidrug resistant (MDR)-TB was assumed to be 1.1%. For CXR, sensitivity was assumed to be 98% (range: 68% to 99%) and specificity was assumed to be 95% (range: 56% to 99.8%). For TST, sensitivity was assumed to be 99% (range: 43% to 99%) and specificity was assumed to be 88% (range: 62% to 95%). For symptom questionnaires, sensitivity was assumed to be 75% (range 22% to 80%) and specificity was assumed to be 95% (range: 50% to 95%).

Overall, CXR (total cost per case: $37,400) was estimated to be more cost-effective than TST (total cost per case: $60,300) or a symptom questionnaire (total cost per case: $84,100). This was attributed to the reduced number of secondary cases identified by early and accurate identification of TB cases.

Critical appraisal found this study to have potentially serious limitations. It was noted that the study calculated costs only (no estimation of cost effectiveness, such as ICERs or QALYs), and future costs were discounted at 3% (rather than 3.5% as recommended by the NICE economic evaluation checklist). As the study was conducted in the USA, the findings may not be applicable to the UK setting.

Economic evaluations of case-finding strategies for TB (both active TB and LTBI)

Kawatsu and others conducted a cost-effectiveness study which modelled the cost of 2 different prison entry case-finding strategies compared to no active case-finding at prison admission in Japan (4). The strategies studied were:

1. No active case finding (self-referral)
2. CXR
3. IGRA

If the CXR was positive, microbiological testing was used to confirm active TB. If IGRA was positive, CXR was used to confirm active TB diagnosis. If the IGRA result was positive and CXR negative, the individual was diagnosed with LTBI. All diagnosed TB cases were treated.

The economic model used a hypothetical cohort of 10,000 prison residents aged 20 years or older. Model parameters were taken from published literature and the Japan Tuberculosis Surveillance Data. Costs were given in 2018 US dollars. The model assumed that a person who self-referred themselves to healthcare facilities with symptoms of TB, not identified through active case finding, would result in an average of 0.7 secondary active TB cases, while an actively diagnosed case would result in an average of 0.3 secondary active TB cases. All secondary TB cases were assumed to be detected passively.

The prevalence of LTBI in the model was assumed by the study to be 20,000 per 100,000. During the model, the probability of LTBI developing into active TB was assumed to be between 2% and 10%, and the probability of having MDR-TB was assumed to be 0.3%. Sensitivity of CXR was assumed to be 97% (range: 95% to 100%) but the assumed specificity was not reported. For IGRA, sensitivity was assumed to be 83% (range: 50% to 100%) and specificity was assumed to be 99% (range: 50% to 100%).

For this hypothetical cohort of 10,000 prison residents, the total cost of case finding, diagnosis, treatment, and hospitalisation, during incarceration and release for the different strategies were estimated to be:

- self-referral: $1.94 million over 2 years
- IGRA: $2.44 million over 2 years
- CXR: $1.96 million over 2 years

IGRA was estimated to be more cost-effective than CXR for detection of TB infection (CXR was used to confirm active disease in IGRA positive cases). Compared to no case finding strategy, IGRA had an ICER of $2,672.31 per active TB case averted (an additional $470,459.14 for 176 active TB cases averted), while CXR had an ICER of $43,984.39. IGRA was always more cost effective even when different estimates of LTBI prevalence were used, although the ICER for IGRA rose from $1,602 at an LTBI prevalence of 30% to $64,256 at an LTBI prevalence of 1%. Critical appraisal found this study to have potentially serious limitations. It was noted that future costs were not calculated and QALYs were not estimated. As the study was conducted in Japan, the findings may not be applicable to the UK setting.

Kowada modelled the effectiveness of 4 different prison admission case finding strategies in Japan (5). The case finding strategies for TB were:

1. IGRA
2. TST
3. TST followed by IGRA
4. CXR

For the first 3 of these case finding strategies, a positive test was followed by a CXR. This led to 6 months standard treatment for active TB if positive or 9 months of preventative treatment if negative.

The model used a hypothetical cohort of 20-year-old prisoners with 4 health states: healthy, LTBI, active TB infection (MDR or non-MDR), and death. Model parameters were derived from published literature. Assumptions about secondary transmission were not reported. Costs were based on 2012 prices and given in US dollars.

The incidence of LTBI was assumed by the study to be 2,600 per 100,000, the incidence of active TB to be 24 per 100,000, and the probability of having MDR-TB to be 7%. For IGRA, sensitivity was assumed to be 70% (95% CI: 63% to 78%) and specificity was assumed to be 99% (95% CI: 98% to 100%). For TST, sensitivity was assumed to be 77% (95% CI: 71% to 82%) and specificity (Bacillus Calmette-Guérin (BCG) vaccinated) was assumed to be 59% (95% CI: 46% to 73%) and 97% (95% CI: 95% to 99%, non-BCG vaccinated).

Total costs included direct (inpatient and outpatient) and indirect (loss of productivity) costs. Total costs per case finding strategy were reported as:

- IGRA: $1477.92 per year
- TST: $1890.20 per year
- TST followed by IGRA: $1515.38 per year
- CXR: $8911.10 per year

QALYs gained per case finding strategy were:

- IGRA: 27.92
- TST: 27.90
- IGRA and TST: 27.92
- CXR: 26.56

Overall, IGRA was more effective and cost less than other case finding strategies for detection of TB infection. IGRA and TST combined had an ICER of $349,574.93 per QALY gained when compared to IGRA alone as the reference strategy. The study authors suggested that the combined use of IGRA and TST would exceed the typical willingness-to-pay threshold for healthcare providers, with IGRA alone being more cost-effective. Across the different model scenarios (which varied rates of BCG vaccination, human immunodeficiency virus (HIV) infection, inclusion of MDR-TB as well as inclusion of both HIV and MDR-TB), IGRA and TST combined had ICERs of between $40,415.81 and $65,330.53. IGRA remained the most cost-effective across different model scenarios.

Critical appraisal found this study to have minor limitations. Future costs were discounted at 3%, rather than 3.5% (as recommended by the NICE economic evaluation tool). As the study was conducted in Japan, the findings may not be applicable to the UK setting.

Health inequalities

This review was focused on people in prisons, who are an inclusion health group and population at risk of a range of health inequalities, typically set against a backdrop of entrenched socio-economic disadvantage. Imprisonment is a significant risk factor for poor health outcomes and these groups are at higher risk of acute (including TB) and chronic disease, mental health issues, drug and alcohol dependence and reduced life expectancy.

There was limited evidence on effectiveness of active case finding for TB in additional subgroups of people in prisons, who may be at further risk of health inequalities, specified in the protocol: people with immunosuppression, silicosis (a lung disease caused by breathing in small amounts of silica particles), chronic renal failure, leukaemia, diabetes, mental health illness, and cancers of the head, neck, or lung, people who use alcohol and substances (such as injection drug use), people experiencing homelessness, and people from countries with a high TB incidence. The proportion of residents with HIV was modelled in one cost-effectiveness study, which stated that that the cost-effectiveness of IGRA was not affected by the HIV infection rate (5).

This review only considered active case finding for TB in prisons, which this group is at increased risk of. The limited evidence identified in subgroups at potential additional risk of health inequalities signals a range of gaps in current existing evidence.

Limitations

This rapid systematic review used streamlined systematic methods to accelerate the review process. Sources of evidence searched included databases of peer-reviewed and preprint research, and looking through references of relevant guidelines, but an extensive search of other sources was not conducted and most article screening was completed without duplication, so it is possible relevant evidence may have been missed.

Data from WHO was used to determine the TB incidence in various countries and classify them as low or moderate incidence. However, it is important to acknowledge potential inaccuracies in TB reporting in some countries.

Only one study used an economic model with QALYs. There is therefore limited evidence for the cost-effectiveness of different case finding strategies in adult prisons.

Three other studies with economic models looked at the cost per case identified, as did one other economic evaluation that did not use an economic model. While cost per case identified can be a useful indicator of relative cost-effectiveness, it does not include information about quality or quantity of life, and thus provides less information than studies incorporating QALYs. These studies were not conducted in the UK and therefore may have limited generalisability to UK costs and the UK prison system.

The findings should not be compared between studies, because the case finding strategies (and their comparator reference tests) considered by each study differed, and the economic evaluations used different assumptions to inform their models (including sensitivity and specificity estimates).

Evidence gaps

No evidence was identified for stage of disease identified, refusal of case finding intervention, incidence of adverse events, health and social care utilisation by an individual infected with TB, length of stay, and mortality.

Limited evidence was identified on the sensitivity and specificity of individual case finding strategies, and the cost-effectiveness of different case finding strategies compared with no strategy in prisons.

Across studies, a range of case finding strategies were reported, including TST, IGRA, CXR, and symptom questionnaires. However, the small number of studies means there was limited information about each case finding strategy and limited evidence which compares each strategy. No evidence was identified on risk stratification algorithms.

Only studies conducted in adult prisons were identified. There were no studies identified that were conducted in foreign national prisons, immigration removal centres, children and young people secure estates, or approved premises. No studies were identified in UK prisons, which may limit the generalisability of the included evidence.

Conclusion

This rapid systematic review examined the effectiveness and cost-effectiveness of various latent and active TB case-finding strategies in prisons, including 7 studies.

For detection of active TB, one study suggested that TST had low sensitivity (35.6%) and moderate specificity (73.9%) when compared to CXR. An economic evaluation also suggested that CXR was more cost-effective than TST for detection of active TB. These findings support that TST should not be used for diagnosis of active TB.

For detection of LTBI, economic evaluations suggested that IGRA was cheaper than TST and more cost effective than CXR, for detection of TB infection (with CXR used to confirm active respiratory TB disease). The evidence of effectiveness of TB case finding strategies in prisons from economic evaluations was also limited, with only one study using QALYs in their cost-effectiveness model.

For detection of TB infection on admission to prison, 2 economic evaluations suggested that IGRA may be more cost-effective than TST, TST followed by IGRA, and CXR. It should be noted that CXR was used to confirm active TB if individuals were IGRA positive, as IGRA alone cannot confirm active TB.

There was no evidence identified for any other measure of effectiveness of TB case finding strategies.

Critical appraisal of the studies highlighted variability in quality of reporting of methods, with some lacking detailed information on the economic models. There were also potential biases related to the conduct and the interpretation of reference standards in the study presenting enough to data to calculate sensitivity and specificity. Due to differences in case-finding strategies, reference standards and model assumptions between studies, the findings are not directly comparable between studies.

The rapid systematic review highlights a gap in comprehensive evidence regarding the effectiveness of various case-finding strategies in prison settings. Overall, there was limited evidence reporting effectiveness of the strategies. No studies were conducted in UK prisons, which may affect the generalisability of these findings to UK prisons, however it offers some insights into the accuracy and cost-effectiveness of individual TB case-finding methods.

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References

1. Bellin E and others. 'Abnormal chest x-rays in intravenous drug users: implications for tuberculosis screening programs' American Journal of Public Health 1993: volume 83, issue 5, pages 698 to 700
2. Nijhawan AE and others. 'Cost analysis of tuberculin skin test and the QuantiFERON-TB Gold In-tube test for tuberculosis screening in a correctional setting in Dallas, Texas, USA' BMC Infectious Diseases 2016: volume 16, issue 1, page 564
3. Jones TF and others. 'Miniature chest radiograph screening for tuberculosis in jails: a cost-effectiveness analysis' American Journal of Respiratory and Critical Care Medicine 2001: volume 164, issue 1, pages 77 to 81
4. Kawatsu L and others. 'A cost-effectiveness study of tuberculosis and latent tuberculosis infection screening in prisons in Japan' International Journal of Tuberculosis and Lung Disease 2020: volume 24, issue 5, pages 506 to 511
5. Kowada A. 'Cost-effectiveness of interferon-gamma release assay for entry tuberculosis screening in prisons' Epidemiology and Infection 2013: volume 141, issue 10, pages 2224 to 2234
6. Degner NR and others. 'Comparison of Digital Chest Radiography to Purified Protein Derivative for Screening of Tuberculosis in Newly Admitted Inmates' Journal of Correctional Health Care 2016: volume 22, issue 4, pages 322 to 330
7. UK Health Security Agency. 'WHO estimates of tuberculosis incidence by country and territory, 2020' 2022 (viewed on 24 October 2023)
8. 'World Health Organisation (WHO) Global TB Programme website' (viewed on 2 December 2024)
9. National Institute for Health and Care Excellence. 'The Guidelines Manual: Appendix G: Methodology Checklist: economic evaluations' 2012
10. Whiting PF and others. 'QUADAS-2: a revised tool for the quality assessment of diagnostic accuracy studies' Annals of Internal Medicine 2011: volume 155, issue 8, pages 529 to 536
11. Bergmann JS and others. 'Clinical Evaluation of the Enhanced Gen-Probe Amplified Mycobacterium Tuberculosis Direct Test for Rapid Diagnosis of Tuberculosis in Prison Inmates' Journal of Clinical Microbiology 1999: volume 37, issue 5, pages 1,419 to 1,425
12. Evrevin M and others. 'Improving tuberculosis management in prisons: Impact of a rapid molecular point-of-care test' Journal of Infection 2021: volume 82, issue 2, pages 235 to 239
13. Smith MB and others. 'Evaluation of the Roche AMPLICOR MTB assay for the detection of Mycobacterium tuberculosis in sputum specimens from prison inmates' Diagnostic Microbiology and Infectious Disease 1997: volume 27, issue 4, pages 113 to 116
14. World Health Organization. 'Global Tuberculosis Report 2023' 2023
15. Sterne JAC and others. 'RoB 2: a revised tool for assessing risk of bias in randomised trials' British Medical Journal 2019: volume 366, page l4,898
16. Sterne JA and others. 'ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions' British Medical Journal 2016: volume 355, page i4919

Annexe A. Protocol

Review question

There is one review question:

1. What are the effective strategies of case finding for tuberculosis (TB) in prisons and places of detention?

A search for primary evidence to answer this review question will be conducted up to 3 July 2024.

Only studies in populations from countries or territories with low or moderate TB incidence (estimated incidence rate of less than 40 per 100,000 in 2022) will be included (14).

Only studies examining prison residents and detainees will be included. Studies only examining staff or visitors to prisons and places of detention will be excluded.

Strategies of case finding could be either at entry to the prison or place of detention or during a stay in the prison or place of detention.

Eligibility criteria

Table A.1 Inclusion and exclusion criteria

	Included	Excluded
Population	Prison residents and detainees in prisons and places of detention	Any other population, including prison staff, prison officers, and visitors to prisons and places of detention
Context	Countries or territories with low or moderate TB incidence (estimated incidence rate less than 40 per 100,000 in 2020)	Countries or territories with high TB incidence (estimated incidence rate at least 40 per 100,000 in 2022)
Settings	Prisons and places of detention, comprising: • adult prisons • foreign national prisons • immigration removal centres	Other settings, including asylum centres, forensic secure hospitals

	Included	Excluded
	• children and young people secure estates • approved premises	
Intervention or exposure	Strategies of case finding for TB, compared to each other or no strategies, comprising: • risk stratification algorithms including social, demographic and clinical histories • symptom assessment • imaging assessment (for example, X-ray, CT scan) • TB sampling (sputum, and faecal and urine for children and people with HIV) • Mantoux test • interferon gamma release assay (IGRA) test	Any other intervention not listed
Outcomes	Any of the following measures of effectiveness for strategies of TB case finding: • sensitivity and specificity of the case finding strategy • additional cases identified and treated as a result of the case finding strategy • stage of disease identified • refusal of case finding intervention • transmission prevented within the prison or place of detention as a result of the case finding strategy • incidence of adverse events, complications, safety, and tolerability • health and social care related quality of life, if considering side effects, including long term harm or disability • health and social care utilisation, including length of stay, planned and unplanned contacts	

	Included	Excluded
	• cost-effectiveness • mortality For observational studies on TB case finding, the outcomes need to occur close in time to the intervention (during the intervention time period or shortly afterwards)	
Language	English	Any other language
Date of publication	Up to 3 July 2024	
Study design	Experimental studies, including but not limited to: • randomised-controlled trials • quasi-experimental studies • cross-over designs • before-and-after studies Observational studies, including but not limited to: • cross-sectional • cohort	• reviews (all types) • case-control studies • modelling studies • qualitative research • mixed method studies • case reports • case series • ecological studies
Publication type	• peer-reviewed published research • preprints	• conference abstracts • editorials • letters • news articles • other grey literature

In this review, countries with a low or moderate TB incidence will be defined as any country or territory with an estimated TB incidence rate of less than 40 per 100,000 people, based on WHO 2022 estimates (7). This includes: Albania, American Samoa, Andorra, Anguilla, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Bahamas, Bahrain, Barbados, Belarus, Belgium, Belize, Bermuda, Bosnia and Herzegovina, British Virgin Islands, Bulgaria, Cabo Verde, Canada, Cayman Islands, Chile, Comoros, Cook Islands, Costa Rica, Croatia, Cuba, Curacao, Cyprus, Czechia, Denmark, Dominica, Egypt, Estonia, Finland, France, French Polynesia, Germany, Greece, Grenada, Guam, Guatemala, Honduras, Hungary, Iceland, Iran (Islamic Republic of), Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kuwait, Latvia, Lebanon, Lithuania, Luxembourg, Maldives, Malta, Mauritius, Mexico, Monaco, Montenegro, Montserrat, Netherlands (Kingdom of the), New Caledonia, New Zealand, North Macedonia,

Norway, occupied Palestinian territory, including east Jerusalem, Oman, Poland, Portugal, Puerto Rico, Qatar, Republic of Korea, Russian Federation, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Saudi Arabia, Serbia, Seychelles, Sint Maarten (Dutch part), Slovakia, Slovenia, Spain, Suriname, Sweden, Switzerland, Syrian Arab Republic, Togo, Tokelau, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turks and Caicos Islands, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay, Vanuatu, Wallis and Futuna.

Identification of studies

The following databases will be searched for studies published up to 3 July 2024: OVID Medline and Embase, Emcare and Web of Science Preprint Citation Index. The search strategy is presented below. Duplicates from the main database search will be identified and removed using Deduklick.

The TRIP database will be searched for guidance and recommendations from NICE and WHO, and the websites for European Centre for Disease Control and US Centers for Disease Control and Prevention will be searched separately for guidance and recommendations. The reference lists of relevant guidance, recommendations, or guidelines will be searched for relevant primary studies (backwards citation searching).

Screening

Title and abstract screening of the main database search will be undertaken in duplicate by 2 reviewers for at least 20% of the eligible studies, with the remainder completed by one reviewer. Disagreement will be resolved by discussion or with involvement of a third reviewer where necessary.

Screening on full text will be undertaken by one reviewer and checked by a second.

Citation searching of reference lists of guidance, recommendations, and guidelines will be undertaken manually by one reviewer. Potentially relevant studies will be screened by one reviewer.

Data extraction

Summary information for each study will be extracted and reported in tabular form. Information to be extracted will include country, study period, study design, intervention, participants, results, and any relevant contextual data, and will be separated by active or latent TB, where possible. This will be undertaken by one reviewer and checked by a second.

Risk of bias assessment

Two reviewers will independently complete a risk of bias assessment for included studies, with disagreements resolved by discussion or with a third reviewer. Interventional primary studies will be assessed using the Cochrane Risk of Bias 2 tool (15). Observational primary studies will be assessed using the ROBINS-I tool for non-randomised studies (16).

Synthesis

If data is presented in a consistent format between studies, a narrative synthesis will be produced to describe the results from this review. The number of studies, the number of participants in each study, effect size and variance and a summary of the risk of bias across studies will be summarised and presented. Alternatively, if data is too heterogeneous, a narrative summary of each study will be provided.

Health inequalities

Variations across the following populations and subgroups will be considered, where evidence is available: people living with HIV, people with immunosuppression, silicosis, chronic renal failure, leukaemia, diabetes, mental health illness, and cancers of the head, neck, or lung, people who use alcohol and substances (such as injection drug use), people from a deprived background, people experiencing homelessness, people who have previously been incarcerated, and people from countries with a high TB incidence.

Search strategy

Ovid MEDLINE(R) ALL (1946 to 2 July 2024)

1. exp Prisoners/ (19029)
2. exp Correctional Facilities/ (12014)
3. Incarceration/ (92)
4. Criminals/ (6572)
5. "Transients and Migrants"/ or Refugees/ or exp Human Migration/ (50889)
6. Deportation/ (31)
7. (immigrat* adj5 (force* or illegal* or undocument* or involuntar* or irregular*)).tw,kf. (384)
8. (migrat* adj5 (force* or illegal* or undocument* or involuntar* or irregular*)).tw,kf. (2410)
9. (emigrat* adj5 (force* or illegal* or undocument* or involuntar* or irregular*)).tw,kf. (93)
10. immigrant*.tw,kf. (31988)
11. migrant*.tw,kf. (27296)
12. emigrant*.tw,kf. (1784)
13. refugee*.tw,kf. (15970)
14. asylum.tw,kf. (4928)
15. asylee*.tw,kf. (58)
16. ((flee* or displace*) adj3 (person* or people* or population* or citizen*)).tw,kf. (2800)
17. (ICE adj3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)).tw,kf. (422)
18. (Border* adj3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)).tw,kf. (404)
19. (customs adj3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)).tw,kf. (119)
20. (deportation* or deported).tw,kf. (840)
21. (prison* or imprison* or detain* or detention or custod* or jail* or gaol* or remand* or internment* or interned or offender* or convict* or criminal*).tw,kf. (73735)
22. (secure adj2 (setting* or facilit* or institut* or estate* or home* or centre* or center* or environment*)).tw,kf. (1146)
23. ((correctional or corrections) adj2 (setting* or facilit* or institut* or estate* or home* or centre* or center*)).tw,kf. (2852)
24. (incarcerat* or carcereal*).tw,kf. (15900)
25. (depriv* adj2 (freedom* or liberty)).tw,kf. (361)
26. (inmate* or penal or penitentiar*).tw,kf. (8221)
27. ((youth or young) adj offender*).tw,kf. (653)
28. ((child* or teen*) adj offender*).tw,kf. (23)
29. ((child* or teen* or youth or young) adj home*).tw,kf. (2114)
30. approved premis#s.tw,kf. (10)
31. probation*.tw,kf. (1996)
32. (halfway hous* or half way hous*).tw,kf. (295)
33. parole*.tw,kf. (1029)

34. or/1-33 (190858)
35. tuberculos#s.tw,kf. (244064)
36. exp Tuberculosis/ (209816)
37. LTBI.tw,kf. (3297)
38. TB.tw,kf. (78817)
39. Mycobacterium tuberculosis/ (59161)
40. or/35-39 (311879)
41. Tuberculin Test/ (14397)
42. ((TB or tubercul*) adj3 (react* or sensitiv* or positiv* or test* or sampl*)).tw,kf. (30428)
43. mantoux.tw,kf. (1724)
44. (tst adj3 (react* or sensitiv* or positiv*)).tw,kf. (1469)
45. (Interferon-Gamma Release Assay or IGRA).tw,kf. (2520)
46. QTF-Plus.tw,kf. (4)
47. QuantiFERON-TB Gold Plus.tw,kf. (193)
48. (case adj3 (find* or identif*)).tw,kf. (31506)
49. Sputum/ (23408)
50. (sputum adj3 (exam* or test* or collect* or sampl* or specimen* or collect*)).tw,kf. (10984)
51. (muc?us adj3 (exam* or test* or collect* or sampl* or specimen* or collect*)).tw,kf. (2109)
52. Swab*.tw,kf. (49776)
53. sputum-smear microscopy.tw,kf. (561)
54. Culture.tw,kf. (716254)
55. Diagnosis/ or Early Diagnosis/ (48330)
56. diagnosis.tw,kf. (2006696)
57. diagnostic.tw,kf. (949328)
58. Mass Screening/ (118414)
59. Diagnostic Services/ or Diagnostic Screening Programs/ (2161)
60. screening.tw,kf. (724346)
61. radiograph*.tw,kf. (283485)
62. (xray* or x-ray*).tw,kf. (457560)
63. exp Radiography, Thoracic/ (40826)
64. Xpert MTB*.tw,kf. (1795)
65. Xpert Ultra.tw,kf. (203)
66. exp Ultrasonography/ (497890)
67. exp Echocardiography/ (151833)
68. (ultrasound* or ultrasonograph*).tw,kf. (435530)
69. echocardiogra*.tw,kf. (189567)
70. echograph*.tw,kf. (10529)
71. echotomograph*.tw,kf. (764)
72. exp Tomography, X-Ray Computed/ (506110)
73. CT scan*.tw,kf. (124447)
74. Comput* tomograph*.tw,kf. (408257)
75. (biopsies or Biopsy).tw,kf. (470194)
76. exp Biopsy/ (312651)

77. Diagnostic Imaging/ (47066)
78. imaging.tw,kf. (1132291)
79. ((clinical* or symptom*) adj3 (evaluat* or assess*)).tw,kf. (368321)
80. Symptom Assessment/ (7134)
81. or/41-80 (6609779)
82. 34 and 40 and 81 (3371)

Embase (1974 to 2 July 2024)

1. prisoner/ (19373)
2. exp correctional facility/ (4059)
3. exp incarceration/ (2459)
4. exp detention center/ or asylum seeker center/ (4230)
5. deportation/ (146)
6. correctional staff/ (226)
7. offender/ (17620)
8. exp migrant/ or exp refugee/ or exp migration/ (97184)
9. (Immigrat* adj5 (force* or illegal* or undocument* or involuntar* or irregular*)).tw,kf. (382)
10. (emigrat* adj5 (force* or illegal* or undocument* or involuntar* or irregular*)).tw,kf. (86)
11. (migrat* adj5 (force* or illegal* or undocument* or involuntar* or irregular*)).tw,kf. (2515)
12. Immigrant*.tw,kf. (36850)
13. Migrant*.tw,kf. (27142)
14. emigrant*.tw,kf. (2293)
15. Refugee*.tw,kf. (17341)
16. Asylum.tw,kf. (5341)
17. asylee*.tw,kf. (64)
18. ((flee* or displace*) adj3 (person* or people* or population* or citizen*)).tw,kf. (2913)
19. (ICE adj3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)).tw,kf. (457)
20. (Border* adj3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)).tw,kf. (476)
21. (customs adj3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)).tw,kf. (136)
22. (deportation* or deported).tw,kf. (936)
23. (prison* or imprison* or detain* or detention or custod* or jail* or gaol* or remand* or internment* or interned or offender* or convict* or criminal*).tw,kf. (89828)
24. (secure adj2 (setting* or facilit* or institut* or estate* or home* or centre* or center* or environment*)).tw,kf. (1686)
25. ((correctional or corrections) adj2 (setting* or facilit* or institut* or estate* or home* or centre* or center*)).tw,kf. (3385)
26. (incarcerat* or carcereal*).tw,kf. (19480)
27. (depriv* adj2 (freedom* or liberty)).tw,kf. (472)
28. (inmate* or penal or penitentiar*).tw,kf. (10239)

29. ((youth or young) adj offender*).tw,kf. (864)
30. ((child* or teen*) adj offender*).tw,kf. (29)
31. ((child* or teen* or youth or young) adj home*).tw,kf. (2352)
32. approved premis#s.tw,kf. (13)
33. probation*.tw,kf. (2424)
34. (halfway hous* or half way hous*).tw,kf. (344)
35. parole*.tw,kf. (1109)
36. or/1-35 (241914)
37. tuberculos#s.tw,kf. (223529)
38. exp tuberculosis/ (232880)
39. LTBI.tw,kf. (4712)
40. TB.tw,kf. (97005)
41. Mycobacterium tuberculosis/ (78506)
42. or/37-41 (323349)
43. tuberculin test/ (19970)
44. interferon gamma release assay/ (5751)
45. ((TB or tubercul*) adj3 (react* or sensitiv* or positiv* or test* or screen* or sampl*)).tw,kf. (39777)
46. mantoux.tw,kf. (2694)
47. (tst adj3 (react* or sensitiv* or positiv*)).tw,kf. (2190)
48. ((Interferon-Gamma Release Assay or IGRA) adj3 positiv*).tw,kf. (1083)
49. QTF-Plus.tw,kf. (6)
50. QuantiFERON-TB Gold Plus.tw,kf. (305)
51. (case adj3 (find* or identif*)).tw,kf. (45283)
52. exp sputum examination/ (34147)
53. (sputum adj3 (exam* or test* or collect* or sampl* or specimen* or collect*)).tw,kf. (16952)
54. (muc?us adj3 (exam* or test* or collect* or sampl* or specimen* or collect*)).tw,kf. (2684)
55. Swab*.tw,kf. (69708)
56. sputum-smear microscopy.tw,kf. (699)
57. Culture.tw,kf. (897198)
58. diagnosis/ or diagnostic reasoning/ or diagnostic test/ or early diagnosis/ (1730130)
59. diagnosis.tw,kf. (2911454)
60. diagnostic.tw,kf. (1332033)
61. mass screening/ (63343)
62. screening/ or screening test/ (280924)
63. screening.tw,kf. (1021657)
64. radiograph*.tw,kf. (334885)
65. (xray* or x-ray*).tw,kf. (519716)
66. exp thorax radiography/ (241169)
67. Xpert MTB*.tw,kf. (2615)
68. Xpert Ultra.tw,kf. (234)
69. exp echography/ (1061053)
70. exp echocardiography/ (461756)

71. (ultrasound* or ultrasonograph*).tw,kf. (669672)
72. echocardiogra*.tw,kf. (339865)
73. echograph*.tw,kf. (13987)
74. echotomograph*.tw,kf. (938)
75. exp x-ray computed tomography/ (113397)
76. CT scan*.tw,kf. (223892)
77. Comput* tomograph*.tw,kf. (522762)
78. (biopsies or Biopsy).tw,kf. (777026)
79. biopsy/ or exp respiratory tract biopsy/ (230123)
80. diagnostic imaging/ (260190)
81. imaging.tw,kf. (1595746)
82. ((clinical* or symptom*) adj3 (evaluat* or assess*)).tw,kf. (559462)
83. symptom assessment/ (12943)
84. or/43-83 (9581253)
85. 36 and 42 and 84 (5357)
86. limit 85 to conference abstract (1085)
87. 85 not 86 (4272)
88. limit 87 to (editorial or letter) (250)
89. 87 not 88 (4022)

Ovid Emcare (1995 to 2 July 2024)

1. prisoner/ (6323)
2. exp correctional facility/ (1341)
3. exp incarceration/ (918)
4. exp detention center/ or asylum seeker center/ (1419)
5. deportation/ (98)
6. correctional staff/ (115)
7. offender/ (15992)
8. exp migrant/ or exp refugee/ or exp migration/ (34398)
9. (Immigrat* adj5 (force* or illegal* or undocument* or involuntar* or irregular*)).tw,kf. (177)
10. (emigrat* adj5 (force* or illegal* or undocument* or involuntar* or irregular*)).tw,kf. (21)
11. (migrat* adj5 (force* or illegal* or undocument* or involuntar* or irregular*)).tw,kf. (789)
12. Immigrant*.tw,kf. (20444)
13. Migrant*.tw,kf. (13614)
14. emigrant*.tw,kf. (532)
15. Refugee*.tw,kf. (10348)
16. Asylum.tw,kf. (3100)
17. asylee*.tw,kf. (43)
18. ((flee* or displace*) adj3 (person* or people* or population* or citizen*)).tw,kf. (1464)
19. (ICE adj3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)).tw,kf. (100)

20. (Border* adj3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)).tw,kf. (178)
21. (customs adj3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)).tw,kf. (72)
22. (deportation* or deported).tw,kf. (539)
23. (prison* or imprison* or detain* or detention or custod* or jail* or gaol* or remand* or internment* or interned or offender* or convict* or criminal*).tw,kf. (46722)
24. (secure adj2 (setting* or facilit* or institut* or estate* or home* or centre* or center* or environment*)).tw,kf. (964)
25. ((correctional or corrections) adj2 (setting* or facilit* or institut* or estate* or home* or centre* or center*)).tw,kf. (2078)
26. (incarcerat* or carcereal*).tw,kf. (9874)
27. (depriv* adj2 (freedom* or liberty)).tw,kf. (325)
28. (inmate* or penal or penitentiar*).tw,kf. (4798)
29. ((youth or young) adj offender*).tw,kf. (711)
30. ((child* or teen*) adj offender*).tw,kf. (22)
31. ((child* or teen* or youth or young) adj home*).tw,kf. (1464)
32. approved premis#s.tw,kf. (13)
33. probation*.tw,kf. (1518)
34. (halfway hous* or half way hous*).tw,kf. (92)
35. parole*.tw,kf. (858)
36. or/1-35 (107976)
37. tuberculos#s.tw,kf. (40021)
38. exp tuberculosis/ (30145)
39. LTBI.tw,kf. (1166)
40. TB.tw,kf. (20306)
41. Mycobacterium tuberculosis/ (7516)
42. or/37-41 (52871)
43. tuberculin test/ (2836)
44. interferon gamma release assay/ (643)
45. ((TB or tubercul*) adj3 (react* or sensitiv* or positiv* or test* or screen* or sampl*)).tw,kf. (7781)
46. mantoux.tw,kf. (367)
47. (tst adj3 (react* or sensitiv* or positiv*)).tw,kf. (484)
48. ((Interferon-Gamma Release Assay or IGRA) adj3 positiv*).tw,kf. (195)
49. QTF-Plus.tw,kf. (1)
50. QuantiFERON-TB Gold Plus.tw,kf. (68)
51. (case adj3 (find* or identif*)).tw,kf. (11797)
52. exp sputum examination/ (5161)
53. (sputum adj3 (exam* or test* or collect* or sampl* or specimen* or collect*)).tw,kf. (2562)
54. (muc?us adj3 (exam* or test* or collect* or sampl* or specimen* or collect*)).tw,kf. (299)
55. Swab*.tw,kf. (13235)
56. sputum-smear microscopy.tw,kf. (204)

57. Culture.tw,kf. (143762)
58. diagnosis/ or diagnostic reasoning/ or diagnostic test/ or early diagnosis/ (263342)
59. diagnosis.tw,kf. (582788)
60. diagnostic.tw,kf. (299532)
61. mass screening/ (8811)
62. screening/ or screening test/ (76733)
63. screening.tw,kf. (230639)
64. radiograph*.tw,kf. (114848)
65. (xray* or x-ray*).tw,kf. (76545)
66. exp thorax radiography/ (43749)
67. Xpert MTB*.tw,kf. (693)
68. Xpert Ultra.tw,kf. (75)
69. exp echography/ (165491)
70. exp echocardiography/ (69019)
71. (ultrasound* or ultrasonograph*).tw,kf. (164145)
72. echocardiogra*.tw,kf. (68096)
73. echograph*.tw,kf. (1686)
74. echotomograph*.tw,kf. (35)
75. exp x-ray computed tomography/ (7975)
76. CT scan*.tw,kf. (44961)
77. Comput* tomograph*.tw,kf. (149760)
78. (biopsies or Biopsy).tw,kf. (97959)
79. biopsy/ or exp respiratory tract biopsy/ (28784)
80. diagnostic imaging/ (51591)
81. imaging.tw,kf. (396388)
82. ((clinical* or symptom*) adj3 (evaluat* or assess*)).tw,kf. (141856)
83. symptom assessment/ (1910)
84. or/43-83 (1906850)
85. 36 and 42 and 84 (1224)
86. limit 85 to conference abstract (0)
87. 85 not 86 (1224)
88. limit 87 to (editorial or letter) (36)
89. 87 not 88 (1188)

Web of Science Preprint Citation Index (1990 to current)

Date of search: 02 July 2014

TS=(immigrat* NEAR/5 (force* or illegal* or undocument* or involuntar* or irregular*)) OR
TS=(migrat* NEAR/5 (force* or illegal* or undocument* or involuntar* or irregular*)) OR
TS=(emigrat* NEAR/5 (force* or illegal* or undocument* or involuntar* or irregular*)) OR
TS=(immigrant*) OR TS=(migrant*) OR TS=(emigrant*) OR TS=(refugee*) OR TS=(asylum) OR
TS=(asylee*) OR TS=((flee* or displace*) NEAR/3 (person* or people* or population* OR

citizen*)) OR TS=(ICE NEAR/3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)) OR TS=(Border* NEAR/3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)) OR TS=(customs NEAR/3 (federal or Enforcement or confine* or removal* or detain* or detention or facilit* or institution*)) OR TS=(deportation* or deported) OR TS=(prison* or imprison* or detain* or detention or custod* or jail* or gaol* or remand* OR internment* OR interned OR offender* OR convict* OR criminal*) OR TS=(secure NEAR/2 (setting* or facilit* or institut* or estate* or home* or centre* or center* OR environment*)) OR TS=((correctional or corrections) NEAR/2 (setting* or facilit* or institut* or estate* or home* or centre* or center*)) OR TS=(incarcerat* or carcereal*) OR TS=(depriv* NEAR/2 (freedom* or liberty)) OR TS=(inmate* or penal or penitentiar*) OR TS=((youth or young) NEAR/0 offender*) OR TS=((child* or teen*) NEAR/0 offender*) OR TS=((child* or teen* or youth or young) NEAR/0 home*) OR TS=(“approved premises” OR “approved premisis”) OR TS=(probation*) OR TS=(“half way hous*” OR “halfway hous*”) OR TS=(parole*)

And

TS=(tuberculosis OR tuberculoses) OR TS=(LTBI OR TB)

And

TS=((TB or tubercul*) NEAR/3 (react* or sensitiv* or positiv* or test* OR sampl*)) OR TS=(Mantoux) OR TS=(tst NEAR/3 (react* or sensitiv* or positiv*)) OR TS=(“Interferon-Gamma Release Assay” or IGRA) OR TS=(“QTF-Plus”) OR TS=(“QuantiFERON-TB Gold Plus”) OR TS=(case NEAR/3 (find* or identif*)) OR TS=(sputum NEAR/3 (exam* or test* or collect* or sampl* or specimen* or collect*)) OR TS=((mucus OR mucous) NEAR/3 (exam* or test* or collect* or sampl* or specimen* or collect*)) OR TS=(Swab*) OR TS=(“sputum-smear microscopy”) OR TS=(Culture) OR TS=(diagnosis OR diagnostic) OR TS=(screening) OR TS=(radiograph* OR “x-ray*” OR xray* OR “Xpert MTB*” OR “Xpert Ultra”) OR TS=(ultrasound* or ultrasonograph* OR echocardiogra* OR “CT scan*” OR “Comput* tomograph*” OR echograph* OR echotomography* OR Biopsy OR biopsies OR imaging) OR TS=((clinical* or symptom*) NEAR/3 (evaluat* or assess*))

12 results

TRIP Database

Date of search: 2 July 2024

‘Tuberculosis’ in title

Filter to: Guidelines

117 results

FAIR Database

Date of search: 3 July 2024

Searched in title and abstract:

- tuberculosis and prison – 13 results
- tuberculosis and jail
- tuberculosis and asylum – 4 results

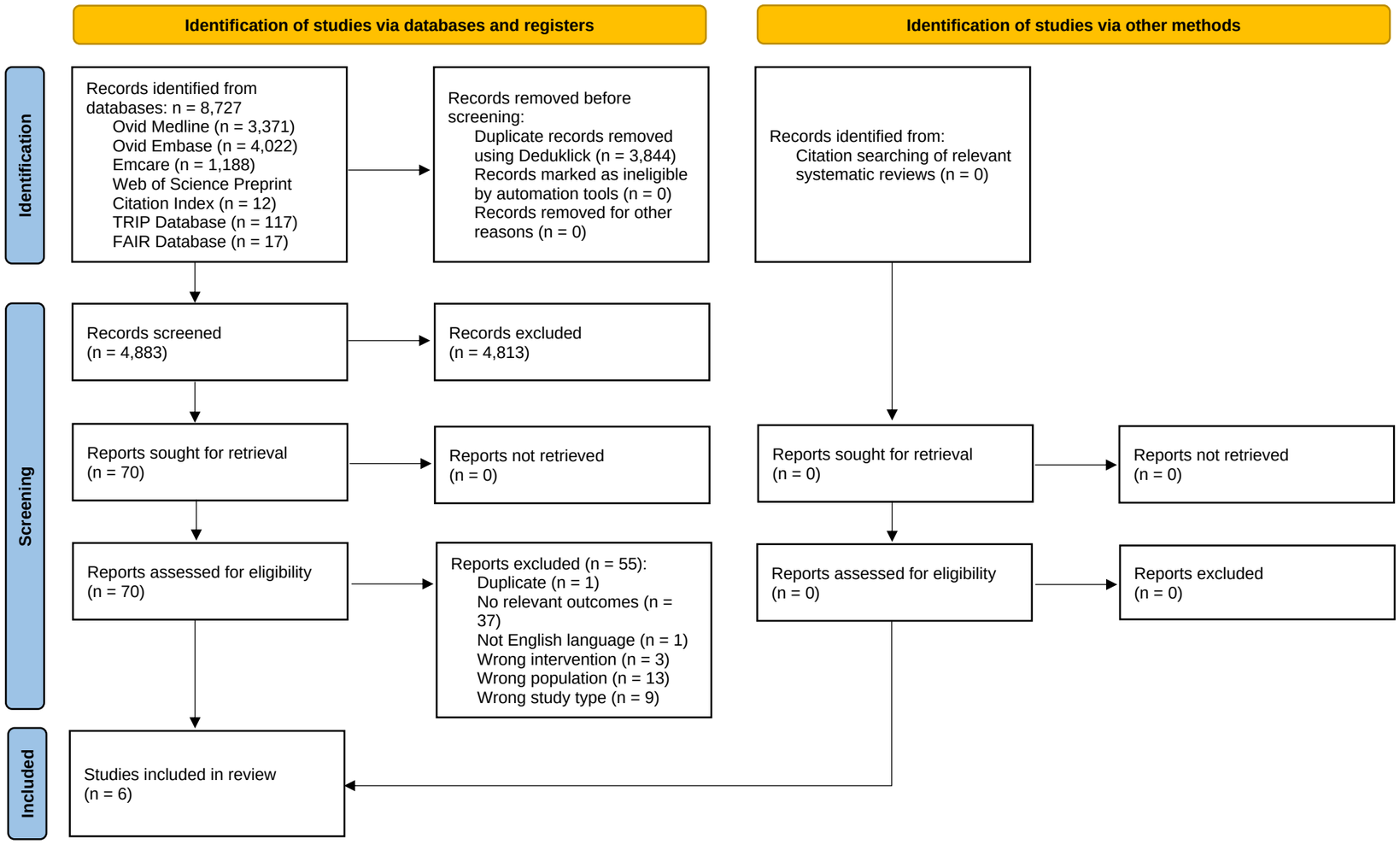
Deviations

There were 2 deviations from the protocol:

1. The NICE appraisal checklist for economic evaluations and the Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) tool were used to assess risk of bias for economic evaluations and diagnostic studies respectively.
2. The World Health Organisation (WHO) estimates of TB incidence reported on GOV.UK (7) were used to determine eligibility for inclusion during screening of studies. This list was withdrawn during the review, therefore the included studies were checked against the Global TB Programme website data to verify TB incidence (8).

Annexe B. Study selection flowchart

Figure B.1. PRISMA diagram



Text version of Figure B.1. PRISMA diagram

A PRISMA diagram showing the flow of studies through this review, ultimately including 15 studies.

From identification of studies via databases and registers, n=8,727 records identified from databases:

- Medline (n = 3,371)
- Embase (n = 4,022)
- Emcare (n = 1,188)
- Web of Science Preprint Citation Index (n = 12)
- TRIP Database (n = 117)
- FAIR Database (n = 17)

From these, records removed before screening:

- duplicate records removed using Deduklick (n=3,844)
- records marked as ineligible by automation tools (n=0)
- records removed for other reasons (n=0)

n=4,883 records screened, of which n=4,813 were excluded, leaving n=70 papers sought for retrieval, of which n=0 were not retrieved.

No studies were identified from identification of studies via other methods.

Of the n=70 papers assessed for eligibility, n=55 reports were excluded:

- duplicate (n = 1)
- no relevant outcomes (n = 37)
- not English language (n = 1)
- wrong intervention (n = 3)
- wrong population (n = 13)
- wrong study type (n = 9)

n=6 papers included in the review.

Annexe C. Excluded full texts

Duplicate (one study)

Saunders and others. 'Tuberculosis screening in the federal prison system: An opportunity to treat and prevent tuberculosis in foreign-born populations' Public Health Reports 2001: volume 116, issue 3, pages 210 to 218

No relevant outcomes (37 studies)

Abascal and others. 'Screening of inmates transferred to Spain reveals a Peruvian prison as a reservoir of persistent Mycobacterium tuberculosis MDR strains and mixed infections' Scientific Reports 2020: volume 10, issue 1, page 2,704

Abeles and others. 'The large city prison – a reservoir of tuberculosis. Tuberculosis control among sentenced male prisoners in New York City' American Review of Respiratory Disease 1970: volume 101, issue 5, pages 706 to 709

Adib and others. 'Tuberculosis in Lebanese jails: prevalence and risk factors' European Journal of Epidemiology 1999: volume 15, issue 3, pages 253 to 260

Aguilera and others. 'Tuberculosis in prisoners and their contacts in Chile: Estimating incidence and latent infection' International Journal of Tuberculosis and Lung Disease 2016: volume 20, issue 1, pages 63 to 70

Ahmad Seyed Alinaghi and others. 'Quickness of HIV and Tuberculosis Diagnostic Procedures in Prison of Tehran, Iran' Infectious Disorders – Drug Targets 2016: volume 16, issue 2, pages 109 to 112

Anonymous and others. 'Tuberculosis prevention in drug-treatment centers and correctional facilities – selected U.S. sites, 1990-1991' MMWR – Morbidity & Mortality Weekly Report 1993: volume 42, issue 11, pages 210 to 213

Assefzadeh and others. 'Tuberculosis case: finding and treatment in the central prison of Qazvin province, Islamic Republic of Iran' Eastern Mediterranean Health Journal 2009: volume 15, issue 2, pages 258 to 263

Baboolal and others. 'Comparison of the QuantiFERON R-TB Gold assay and tuberculin skin test to detect latent tuberculosis infection among target groups in Trinidad & Tobago' Pan American Journal of Public Health 2010: volume 28, issue 1, pages 36 to 42

Baca and others. 'Interferon-gamma release assay for the diagnosis of latent tuberculosis infection in the prison population with a positive tuberculin test: a descriptive study in a prison (Burgos, Spain)' Revista Espanola de Sanidad Penitenciaria 2023: volume 25, issue 3, pages 104 to 111

Bergmann JS and others. 'Clinical Evaluation of the Enhanced Gen-Probe Amplified Mycobacterium Tuberculosis Direct Test for Rapid Diagnosis of Tuberculosis in Prison Inmates' Journal of Clinical Microbiology 1999: volume 37, issue 5, pages 1,419 to 1,425

Carbonara and others. 'Correlates of Mycobacterium tuberculosis infection in a prison population' European Respiratory Journal 2005: volume 25, issue 6, pages 1,070 to 1,076

Chaucer and others. 'Tuberculosis case finding in a county jail' Public Health Reports 1955: volume 70, issue 7, pages 684 to 685

Evrevin M and others. 'Improving tuberculosis management in prisons: Impact of a rapid molecular point-of-care test' Journal of Infection 2021: volume 82, issue 2, pages 235 to 239

Ilievska-Poposka and others. 'Tuberculosis in the Prisons in the Republic of Macedonia, 2008-2017' Open Access Macedonian Journal of Medical Sciences 2018: volume 6, issue 7, pages 1,300 to 1,304

Katyal and others. 'IGRA-Based Screening for Latent Tuberculosis Infection in Persons Newly Incarcerated in New York City Jails' Journal of Correctional Health Care 2018: volume 24, issue 2, pages 156 to 170

Kerani and others. 'A Pilot TB Screening Model in a U.S. Prison Population Using Tuberculin Skin Test and Interferon Gamma Release Assay Based on Country of Origin' Journal of Correctional Health Care 2021: volume 27, issue 4, pages 259 to 264

Kim and others. 'Prevalence of latent tuberculosis infection among participants of the national LTBI screening program in South Korea – A problem of low coverage rate with current LTBI strategy' Frontiers in Public Health 2022: volume 10, page 1066269

Kim and others. 'Analysis of Interferon-Gamma Release Assay Results for Latent Tuberculosis Infection Diagnosis at a Referral Clinical Laboratory in South Korea' American Journal of Biochemistry and Biotechnology 2023: volume 19, pages 292 to 297

Kiter and others. 'Tuberculosis in Nazilli District Prison, Turkey, 1997-2001' International Journal of Tuberculosis & Lung Disease 2003: volume 7, issue 2, pages 153 to 158

Mahler and others. 'Use of targeted mobile X-ray screening and computer-aided detection software to identify tuberculosis among high-risk groups in Romania: descriptive results of the

E-DETECT TB active case-finding project' British Medical Journal Open 2021: volume 11, issue 8, page e045289

Nduaguba and others. 'Evaluation of identifying tuberculosis infection and disease in a rural institutionalized population' Osteopathic Family Physician 2010: volume 2, issue 1, pages 10 to 13

Pelletier and others. 'Tuberculosis in a correctional facility' Archives of Internal Medicine 1993: volume 153, issue 23, pages 2,692 to 2,695

Porsa and others. 'Comparison of a new ESAT-6/CFP-10 peptide-based gamma interferon assay and a tuberculin skin test for tuberculosis screening in a moderate-risk population' Clinical & Vaccine Immunology 2006: volume 13, issue 1, pages 53 to 58

Porsa and others. 'Comparison of an ESAT-6/CFP-10 peptide-based enzyme-linked immunospot assay to a tuberculin skin test for screening of a population at moderate risk of contracting tuberculosis' Clinical & Vaccine Immunology 2007: volume 14, issue 6, pages 714 to 719

Puisis and others. 'Radiographic screening for tuberculosis in a large urban county jail' Public Health Reports 1996: volume 111, issue 4, pages 330 to 334

Ritter and others. 'Prevalence of positive tuberculosis skin tests during 5 years of screening in a Swiss remand prison' International Journal of Tuberculosis & Lung Disease 2012: volume 16, issue 1, pages 65 to 69

Sagnelli and others. 'Blood born viral infections, sexually transmitted diseases and latent tuberculosis in italian prisons: a preliminary report of a large multicenter study' European Review for Medical & Pharmacological Sciences 2012: volume 16, issue 15, pages 2,142 to 2,146

Saunders and others. 'Tuberculosis screening in the federal prison system: an opportunity to treat and prevent tuberculosis in foreign-born populations' Public Health Reports 2001: volume 116, issue 3, pages 210 to 218

Schwartz and others. 'Tuberculosis transmission in a state correctional institution – California, 1990-1991' Journal of the American Medical Association 1992: volume 269, issue 2, pages 200 to 202

Schwartz and others. 'Interferon-gamma release assays piloted as a latent tuberculous infection screening tool in Canadian federal inmates' International Journal of Tuberculosis & Lung Disease 2014: volume 18, issue 7, pages 787 to 792

Smit and others. ‘Cost-effectiveness of screening for active cases of tuberculosis in Flanders, Belgium' Bulletin of the World Health Organization 2017: volume 95, issue 1, pages 27 to 35

Smith MB and others. ‘Evaluation of the Roche AMPLICOR MTB assay for the detection of Mycobacterium tuberculosis in sputum specimens from prison inmates’ Diagnostic Microbiology and Infectious Disease 1997: volume 27, issue 4, pages 113 to 116

Spencer and others. 'Tuberculosis surveillance in a state prison system' American Journal of Public Health 1989: volume 79, pages 507 to 509

Story and others. 'Management and control of tuberculosis control in socially complex groups: a research programme including three RCTs' Programme Grants for Applied Research 2020: volume 8, issue 9

Thompson and others. 'Tuberculosis symptom screening among new prisoners in two Greater Manchester prisons' Public Health 2009: volume 123, issue 1, pages 86 to 88

Tulenkov and others. 'Early detection of tuberculosis in women prisoners in Russia' Internet Journal of Epidemiology 2016: volume 14, issue 1

Not English language (one study)

Rodrigo and others. 'Evaluation of the Integrated Tuberculosis Research Program Sponsored by the Spanish Society of Pulmonology and Thoracic Surgery: 11 Years on' Archivos De Bronconeumologia 2020: volume 56, issue 8, pages 483 to 492

Wrong intervention (3 studies)

Agostinis and others. 'Interferon-gamma release assays for latent tuberculosis infection screening in Canadian federal correctional facilities' International Journal of Tuberculosis & Lung Disease 2021: volume 25, issue 6, pages 447 to 452

Baker and others. 'The use and results of diagnostic and therapeutic bronchoscopies in a prison population' Journal of the American Osteopathic Association 1970: volume 69, issue 7, pages 646 to 650

Brock and others. 'Tuberculosis case detection in a state prison system' Public Health Reports 1998: volume 113, issue 4, pages 359 to 364

Wrong population (12 studies)

Arroyave and others. 'Negative latent tuberculosis at time of incarceration: identifying a very high-risk group for infection' Epidemiology & Infection 2017: volume 145, issue 12, pages 2,491 to 2,499

Donkeng-Donfack and others. 'A cost-benefit algorithm for rapid diagnosis of tuberculosis and rifampicin resistance detection during mass screening campaigns' BMC Infectious Diseases 2022: volume 22, issue 1, page 219

Kosambiya and others. 'Active case finding of pulmonary tuberculosis and HIV infection among prisoners of South Gujarat: A cross sectional study' Indian Journal of Tuberculosis 2022: volume 69, issue 2, pages 213 to 219

Mahler and others. 'Active Case-Finding: An Effective Solution for Tuberculosis Detection in Vulnerable Groups – The Romanian Experience' Risk Management & Healthcare Policy 2024: volume 17, pages 1,115 to 1,125

Morishita and others. 'Bringing state-of-the-art diagnostics to vulnerable populations: The use of a mobile screening unit in active case finding for tuberculosis in Palawan, the Philippines' PLoS ONE [Electronic Resource] 2017: volume 12, issue 2, page e0171310

Rodrigo and others. 'Effectiveness of tuberculosis control programmes in prisons, Barcelona 1987-2000' International Journal of Tuberculosis & Lung Disease 2002: volume 6, issue 12, pages 1,091 to 1,097

Sanchez and others. 'Extensive Mycobacterium tuberculosis circulation in a highly endemic prison and the need for urgent environmental interventions' Epidemiology & Infection 2012: volume 140, issue 10, pages 1,853 to 1,861

Sanchez and others. 'X ray screening at entry and systematic screening for the control of tuberculosis in a highly endemic prison' BMC Public Health 2013: volume 13, page 983

Schmid and others. 'Smear plus Detect-TB for a sensitive diagnosis of pulmonary tuberculosis: a cost-effectiveness analysis in an incarcerated population' BMC Infectious Diseases 2014: volume 14, page 678

Shanks and others. 'Persistent tuberculous disease among inmates of common lodging houses' Journal of Epidemiology and Community Health 1984: volume 38, pages 66 to 67

Story and others. 'Active case finding for pulmonary tuberculosis using mobile digital chest radiography: an observational study' International Journal of Tuberculosis & Lung Disease 2012: volume 16, issue 11, pages 1,461 to 1,467

Velen and others. 'Digital Chest X-Ray with Computer-aided Detection for Tuberculosis Screening within Correctional Facilities' Annals of the American Thoracic Society 2022: volume 19, issue 8, pages 1,313 to 1,319

Winetsky and others. 'Screening and rapid molecular diagnosis of tuberculosis in prisons in Russia and Eastern Europe: a cost-effectiveness analysis' PLoS Medicine 2012: volume 9, issue 11, page e1001348

Wrong study type (9 studies)

Anonymous. 'Portable versus Fixed X-ray Equipment: A Review of the Clinical Effectiveness, Cost-effectiveness, and Guidelines' Canadian Agency for Drugs and Technologies in Health. CADTH Rapid Response Reports 2016: volume 2, page 22

Babudieri and others. 'Tuberculosis Screening before Anti–Hepatitis C Virus Therapy in Prisons' Emerging Infectious Diseases 2012: volume 18, issue 4, pages 689 to 691

de Vries and others. 'Towards selective tuberculosis screening of people in prison in a low-incidence country' European Respiratory Journal 2020: volume 55, issue 4, page 4

Glaser and others. 'Tuberculin skin test conversion among HIV-infected prison inmates' Journal of acquired Immune Deficiency Syndromes 1992: volume 5, issue 4, pages 430 to 431

Mehay and others. 'An audit of tuberculosis health services in prisons and immigration removal centres' Journal of Public Health 2017: volume 39, issue 2, pages 387 to 394

Risser and others. 'Tuberculosis in incarcerated youth in Texas' JAMA 2005: volume 293, issue 22, pages 2,716 to 2,717

Safyer and others. 'Tuberculosis in correctional facilities: the Tuberculosis Control Program of the Montefiore Medical Center Rikers Island Health Services' Journal of Law, Medicine & Ethics: a journal of the American Society of Law, Medicine & Ethics 1993: volume 21, pages 342 to 351

Weiler-Ravell and others. 'A stitch in time saves nine: measures to prevent the spread of tuberculosis in the Israeli prison system' Israel Medical Association Journal 2008: volume 10, issue 3, pages 227 to 228

Woodman and others. 'Detecting Tuberculosis in Prisons: Switching Off the Disease at Its Source' Clinical Infectious Diseases 2021: volume 72, issue 5, pages 778 to 779

Annexe D. Data extraction tables

Abbreviations: AFB: acid-fast bacilli, USA, United States of America, BCG: Bacillus Calmette-Guérin, CI: confidence interval, CXR: chest X-ray, HIV: human immunodeficiency virus, ICER: incremental cost-effectiveness ratio, IGRA: interferon gamma release assay, INH: isoniazid, IPT: isoniazid preventive therapy, LTBI: latent TB infection, MDR: multidrug resistant, MTB: mycobacterium tuberculosis NAAT: nucleic acid amplification test, PCR: polymerase chain reaction, QALY: Quality Adjusted Life Year, QFT: QuantiFERON test, TB: tuberculosis, TST: tuberculin skin test, USD: US dollars ($)

Table D.1. Characteristics of diagnostic accuracy study

Study	Country, time period	Population	Case finding intervention(s)	Reference standard	Outcomes
Bellin 1993 (1)	USA, July 1991 to January 1992	1,314 residents in the opiate detoxification unit awaiting trial or with sentences of less than one year (no information on age and sex, 42% HIV prevalence in previous studies of people admitting to history of illicit drug use at intake examination)	1. TST (Mantoux method, read between 2 and 4 days after injection), positive if the diameter of the induration was at least 5mm, or if previous history of positive test 2. CXR (read independently by 2 radiologists), positive if at least one of 11 CXR outcomes were seen Positive CXR findings were indicative of active TB	CXR (assumed for sensitivity and specificity calculations, not stated by study)	Number of people who tested positive and negative by test: • TST negative, CXR negative: 917 (69.8%) • TST negative, CXR positive: 47 (3.6%) • TST positive, CXR negative: 324 (24.7%) • TST positive, CXR positive: 26 (2.0%) Based on these results, assuming CXR correctly identified all cases of active TB: • sensitivity of TST for active TB: 35.6% • specificity of TST for active TB: 73.9%

Table D.2. Characteristics of cost-effectiveness studies with models

Study	Country, time period	Case finding intervention(s)	Model method and utilities	Sensitivity and specificity of test(s)	Other model parameters	Outcomes
Jones 2001 (3)	USA, 1998	1. Miniature CXR 2. TST 3. Symptom questionnaire All case finding methods were only at admission.	Details of decision analysis model population, horizon, and cycle length not specified. Model parameters derived from published literature. Utilities not used (model estimated cost per case identified). All costs were discounted at a fixed 3% annual rate and given in 2009 USD.	Estimated from published literature. Miniature CXR: • sensitivity: 0.98 (range: 0.68 to 0.99) • sensitivity (HIV positive population): 0.9 (range: 0.31 to 0.93) • specificity: 0.948 (range: 0.575 to 0.9975)	• incidence of active TB: 0.00068 (range: 0.00068 to 0.0204) • number of infected contacts, per passively diagnosed active case: 3.5 (range: 0 to 6.5) • number of active cases resulting from exposure to passively diagnosed active case: 0.9 (range: 0.06 to 1.2) • proportion of active TB cases with MDR-TB: 0.011 (range: 0.0 to 0.074) • HIV prevalence: 0.005 (range: 0 to 0.15)	Overall, case finding for active TB with miniature CXR was estimated to be more sensitive and cost-effective than case finding with TST or a symptom questionnaire. Cost of case finding per case identified: • miniature CXR: $9,600 • TST: $32,100 • symptom questionnaire: $54,100 Total cost of case finding, evaluation, and treatment per case: • miniature CXR: $37,400

Study	Country, time period	Case finding intervention(s)	Model method and utilities	Sensitivity and specificity of test(s)	Other model parameters	Outcomes
			It was assumed that each case of active TB detected through case finding at admission would halve the number of infected contacts and future cases of active disease compared to passive diagnosis. Costs included case finding costs (including materials and personnel), confirmation of active TB costs, treatment costs (separately for non-MDR and MDR-TB), and preventative therapy costs for infected contacts without active TB. Sensitivity analyses looked at varying the baseline incidence of active TB (68 per 100,000 in base case), varying the specificity of CXR for active TB, varying the prevalence of HIV, and varying the cost of CXR screening.	• specificity (HIV positive population): 0.94 (range: none) TST: • sensitivity: 0.99 (range: 0.43 to 0.99) • sensitivity (HIV positive population): 0.69 (range: 0.2 to 0.69) • specificity: 0.88 (range: 0.62 to 0.95) • specificity (HIV positive population): 0.98 (range: 0.83 to 0.98) Symptom questionnaire: • sensitivity: 0.75 (range: 0.22 to 0.8) • sensitivity (HIV positive population): 0.81 (range: none) • specificity: 0.95 (range: 0.5 to 0.95) • specificity (HIV positive population): 0.5 (range: none)		• TST: $60,300 • symptom questionnaire: $84,100 Estimated case identification: • miniature CXR: 0.68 cases per 1,000 screened • TST: 0.25 cases per 1,000 screened • symptom questionnaire: 0.09 cases per 1,000 screened Sensitivity analyses, cost of case finding per case identified with miniature CXR: • assuming a specificity of 0.58: $46,600 • TB incidence of 40 cases per 100,000 residents: $15,700 • TB incidence of 20 cases per 100,000 residents: $28,500 • TB incidence of 10 cases per 100,000 residents: $48,500 • TB incidence of 6.8 cases per 100,000 residents (general population prevalence): $62,500 • assuming a cost of miniature CXR case finding per inmate of $25: $36,500
Kawatsu 2020 (4)	Japan, 2018	1. No case finding (diagnosed passively after self-referral) 2. CXR, if positive, bacteriological testing to confirm active TB. Unclear if only at prison entry, or annually.	Hypothetical cohort of 10,000 prison residents aged 20 years or older, 2 year time horizon, decision tree model. Model parameters were derived from published literature and the Japan Tuberculosis Surveillance Data.	Estimated from published literature. CXR: • sensitivity: 0.97 (range: 0.95 to 1.00) • specificity: not reported IGRA:	• LTBI prevalence: 0.20 (range: 0.01 to 0.30) • probability of MDR-TB: 0.003 (range: 0.000 to 0.050) • probability of smear positivity among actively diagnosed cases: 0.139 (range: 0.100 to 0.170) • probability of smear positivity among passively diagnosed	Effectiveness of case finding strategies (10,000 residents for 2 years, base case): • no case finding: total cost of $1.94 million, estimated 314 active TB cases • CXR: total cost of $1.96 million (incremental cost over no case finding: $29,779.19), one active TB case averted (assumed to be rounded), ICER: $43,984.39 (extended dominated)

Study	Country, time period	Case finding intervention(s)	Model method and utilities	Sensitivity and specificity of test(s)	Other model parameters	Outcomes
		3. IGRA (QuantiFERON-TB Gold In-Tube) at prison entry, if positive, CXR. If both tests positive, diagnosed as active TB, if IGRA positive and CXR negative, diagnosed as LTBI. Treatment offered for both active TB and LTBI.	Costs included the costs of case finding, diagnosis, treatment (including for non-MDR and MDR-TB), and hospitalisation (all sputum smear positive cases were necessarily hospitalised until no longer infectious) during incarceration and release. Costs were not discounted, given in 2018 USD, and the model only considered costs up to secondary infection. Case finding effectiveness was defined as the number of active TB cases prevented compared to no case finding, estimated using the initial TB prevalence and number of expected secondary TB infections. It was assumed that a passively diagnosed TB case would produce an average of 3.5 infected contacts and 0.7 secondary active patients, while an actively diagnosed case would produce an average of 1.5 infected contacts and 0.3 secondary active cases. All secondary TB cases were assumed to be detected passively. One-way deterministic sensitivity analyses performed, including varying the prevalence of LTBI between 1% and 30%.	• sensitivity: 0.83 (range: 0.50 to 1.00) • specificity: 0.99 (range: 0.50 to 1.00)	cases: 0.604 (range: 0.450 to 0.760) • probability of starting isoniazid preventive therapy: 0.9 (range: 0.5 to 1.0) • probability of developing side effect: 0.16 (range: 0.47 to 0.194) [note: reported as 0.47 to 0.194 in study, despite not being a possible range] • probability of completing TB treatment in prison: 0.957 (range: 0.698 to 0.999) • probability of completing TB treatment after release: 0.855 (range: 0.698 to 0.999) • probability of terminating TB treatment after release: 0.021 (range: 0.010 to 0.999) • probability of completing isoniazid preventive therapy in prison: 0.93 (range: 0.85 to 0.99) • probability of completing isoniazid preventive therapy after release: 0.24 (range: 0.10 to 0.99) • probability of LTBI developing in active TB cases: 0.10 (range: 0.05 to 0.15) • probability of LTBI developing in active TB cases detected passively: 0.074 (range: none) • probability of LTBI developing in active TB cases detected actively during follow-up: 0.026 (range: none)	• IGRA: total cost of $2.44 million (incremental cost over no case finding: $470,459.14), 176 active TB cases averted, ICER: $2,672.31 IGRA always dominated CXR when varying the LTBI prevalence (LTBI prevalence accounted for 95% of total uncertainty). ICER at 30% prevalence: • CXR: $20,574 • IGRA: $1,602 ICER at 4% prevalence: • CXR: $33,3916 • IGRA: $16,061 ICER at 1% prevalence: • CXR: $1,378,389 • IGRA: $64,256

Study	Country, time period	Case finding intervention(s)	Model method and utilities	Sensitivity and specificity of test(s)	Other model parameters	Outcomes
					• probability of those unscreened developing active TB: 0.020 (range: none) Assumed that all residents were negative for HIV as prevalence is low in Japan.	
Kowada 2013 (5)	Japan, 2012	1. QFT: • if positive, and active TB is detected by CXR and positive sputum smear or culture: treated with 6-month protocol for active TB • if positive, and active TB is not detected by CXR: treated with 9 months of INH chemoprophylaxis • if negative: no CXR or further follow-up 2. TST: • if TST induration diameter is at least 5 mm in a non-BCG vaccinated prisoner or at least 10 mm in a BCG-vaccinated prisoner, and active TB is detected by CXR and positive sputum smear or culture: treated with 6-month protocol for active TB • if TST induration diameter is at least 5 mm in a non-BCG vaccinated prisoner or at least 10 mm in a BCG-vaccinated prisoner, and active TB is not detected by	Prisoners aged 20 years old, lifetime horizon, Markov model (cycle length: one year) with 4 clinical states: 1. Healthy (no LTBI, no TB) 2. LTBI 3. TB (MDR or non-MDR) 4. Death Model parameters derived from a review of Medline studies between 1980 and 2012, using data from primary studies conducted in Japan and meta-analyses of studies conducted in multiple countries. Direct (in-patient and outpatient costs) and indirect costs (loss of productivity) were included. Costs were in lognormal distributions, and utilities were in beta distributions. Utilities: • healthy: 1.00 • LTBI: 1.00	Estimated from published literature. QFT for LTBI: • sensitivity: 0.70 (95% CI: 0.63 to 0.78) • specificity: 0.99 (95% CI: 0.98 to 1.00) TST for LTBI: • sensitivity: 0.77 (95% CI: 0.71 to 0.82) • specificity (BCG-vaccinated): 0.59 (95% CI: 0.46 to 0.73) • specificity (non BCG-vaccinated): 0.97 (95% CI: 0.95 to 0.99) QFT for LTBI in HIV patients: • sensitivity: 0.66 (95% CI: 0.60 to 0.71) • specificity: 0.91 (95% CI: 0.89 to 0.98) TST for LTBI in HIV patients: • sensitivity: 0.43 (95% CI: 0.37 to 0.50)	• annual incidence of LTBI: 0.026 (95% CI: 0.013 to 0.084) • annual incidence of TB: 0.0024 (95% CI: 0.0016 to 0.0064) • probability of having HIV: 0.08 (95% CI: 0.04 to 0.40) • probability of having MDR-TB: 0.07 (95% CI: 0.03 to 0.11) • probability of successful TB treatment: 0.392 (range: 0.1 to 0.6) Mortality rate by decade (age 20 years to age 80 years), probability of developing active TB from LTBI, increased likelihood of progression from LTBI to active TB in advanced, untreated HIV infection, probability of successful TB treatment, probability of recurrence of active TB after treatment, efficacy of standard 9-month INH chemoprophylaxis protocol, adherence rate of standard 9-month INH chemoprophylaxis protocol, probability of INH-induced hepatitis by INH prophylaxis, BCG vaccination rate (at a rate of 0.977 and 0.2 increments between 0 and 1), treatment costs for all tests and	IGRA (Interferon-Gamma Release Assay): • QALYs Gained: 27.92 • ICER: Reference strategy • IGRA alone was more cost-effective than all other tests (dominated them) in the main analyses, considering a BCG vaccination rate of 0.977, and when including both HIV infection and MDR-TB rates in the model • IGRA remained dominant across almost all sensitivity analyses with varying BCG vaccination rates (between 0 and 1 in 0.2 increments) TST and IGRA Combination (TST followed by IGRA): • QALYs Gained: 27.92 • ICER: $349,574.93 in the base case • TST followed by IGRA was not dominated by IGRA alone in 2 models • Base Case: ICER of $349,574.93 per QALY • MDR-TB Only Model: ICER of $318,561.73 per QALY • in sensitivity analyses with a BCG vaccination rate of 1, TST followed by IGRA had ICERs between $40,415.81 and $72,876.29 • in all other analyses, IGRA alone was dominant

Study	Country, time period	Case finding intervention(s)	Model method and utilities	Sensitivity and specificity of test(s)	Other model parameters	Outcomes
		CXR: treated with 9 months of INH chemoprophylaxis • if TST induration diameter is less than 5 mm in a non-BCG vaccinated prisoner or less than 10 mm in a BCG-vaccinated prisoner: no CXR or further follow-up 3. TST followed by QFT • if TST induration diameter is at least 5 mm in a non-BCG vaccinated prisoner or at least 10 mm in a BCG-vaccinated prisoner, QFT is positive, and active TB is detected by CXR and positive sputum smear or culture: treated with 6-month protocol for active TB • if TST induration diameter is at least 5 mm in a non-BCG vaccinated prisoner or at least 10 mm in a BCG-vaccinated prisoner, QFT is positive, and active TB is not detected by CXR: treated with 9 months of INH chemoprophylaxis • if TST induration diameter is at least 5 mm in a non-BCG vaccinated prisoner or at least 10 mm in a BCG-vaccinated prisoner, QFT is negative: no CXR • if TST induration diameter is less than 5 mm in a non-BCG vaccinated prisoner or less than 10 mm in a BCG-	• non-MDR-TB taking chemoprophylaxis (9 months) with no complication: 1.00 • non-MDR-TB taking chemoprophylaxis (9 months) with the complication (liver dysfunction): 0.85 • active non-MDR-TB during treatment and before: 0.80 • dead: 0.00 • active MDR-TB during treatment and before: 0.58 All costs and clinical benefits were discounted at a fixed 3% annual rate. Costs giving in 2012 USD. The base case model did not include the HIV infection and MDR-TB rates, though models were presented that included each rate individually and together, and the BCG vaccination rate was allowed to vary (0.977 in the main analysis, and between 0 and 1 in 0.2 increments for sensitivity analyses).	• specificity (BCG-vaccinated): 0.59 (95% CI: 0.47 to 0.70) • specificity (non BCG-vaccinated): 0.92 (95% CI: 0.91 to 0.94) CXR for active TB in HIV patients: • sensitivity: 0.70 (95% CI: 0.59 to 0.82) • specificity: 0.60 (95% CI: 0.52 to 0.63)	treatments included in cost-effectiveness model.	TST (Tuberculin Skin Test): • QALYs Gained: 27.90 • ICER: Dominated by IGRA alone (less cost-effective) • CXR • QALYs Gained: 26.56 • ICER: Dominated by IGRA alone (less cost-effective) • overall, from the model including both HIV infection and MDR-TB from the main analysis, QFT alone had a total cost of $1,866.05 for a total effectiveness of 27.90 QALYs • from the sensitivity analyses (looking at variations in BCG rate and probabilistic sensitivity analyses using parameter 95% confidence intervals), the cost-effectiveness was not sensitive to the BCG vaccination rate, LTBI rate, TB rate, HIV infection rate, or MDR-TB rate

Study	Country, time period	Case finding intervention(s)	Model method and utilities	Sensitivity and specificity of test(s)	Other model parameters	Outcomes
		vaccinated prisoner: no QFT, CXR or further follow-up 4. CXR • if active TB is detected by CXR and positive sputum smear or culture: treated with 6-month protocol for active TB • if active TB not detected by CXR: no follow-up Interventions were given only at entry into prison.				
Nijhawan 2016 (2)	USA, June to October 2014	1. TST (read 2 to 3 days after injection), positive if the diameter of the induration was at least 5mm in people with a diagnosis of HIV, or at least 10mm in other people. If positive, CXR received, and if the CXR was abnormal, received work-up for TB, and received treatment if diagnosed with active TB. If CXR negative, treatment for LTBI for high-risk people (HIV positive, immunocompromised, chronically ill, recent conversions [past 2 years], and known contacts of TB cases), otherwise, no treatment.	Cost-analysis was performed using a decision-tree model to project costs and consequences over a one year horizon. The main outcome was the total cost per LTBI case identified. Model parameters were estimated using a sample of 529 residents who received TST and IGRA tests without a prior positive TST or history of severe necrotic reaction to the purified protein derivative used for TST (mean age: 33.5 years, 75% male, 46% Black, 29% White, 25% other). 28% of residents were released before TST test reading, and IGRA and TST results were available for 351 residents. Residents released prior to completion of TST and follow up	Estimated from study sample. Number of people who tested positive and negative by test: • TST negative, IGRA negative: 300 (85.5%) • TST negative, IGRA positive: 42 (12.0%) • TST positive, IGRA negative: 4 (1.1%) • TST positive, IGRA positive: 5 (1.4%) Calculated from above results (assuming TST as reference standard): • sensitivity of IGRA: 55.6% • specificity of IGRA: 87.7%	Model parameters estimated using data from residents: • TST placement: 94.3% • TST read: 72% • TST positive: 2.6% • CXR done if TST positive: 80% • IGRA drawn: 95% • IGRA positive: 13% • CXR done if IGRA positive: 72%	Cost per test: • TST: $18.70 • IGRA: $41.97 ($23.37 more than TST) Total cost per LTBI case identified: • TST: $1,246.60 • IGRA: $459.87 ($786.73 less than TST) Sensitivity analyses of cost differences per test: • if IGRA cut off was higher (greater than one IU per ml): IGRA costs $21.67 more than TST • if TST positivity were at average department of criminal justice rates (5.7%): IGRA costs $21.14 more than TST • if labour costs were twice as high as original estimation: IGRA costs $17.60 more than TST

Study	Country, time period	Case finding intervention(s)	Model method and utilities	Sensitivity and specificity of test(s)	Other model parameters	Outcomes
		2. IGRA (QuantiFERON Gold In-tube), positive if at least 0.35 IU per mL. If positive, CXR received, and if the CXR was abnormal, received work-up for TB, and received treatment if diagnosed with active TB. If CXR negative, treatment for LTBI for high-risk people (HIV positive, immunocompromised, chronically ill, recent conversions [past 2 years], and known contacts of TB cases), otherwise, no treatment. Study staff were blinded to IGRA results (unless a result was indeterminate or if there was insufficient sample, staff then received a second specimen if available).	testing for indeterminate IGRA testing, and costs associated with wasted or incomplete tests were included in the model. The model assumed that CXRs would be completed for all non-released individuals was a positive IGRA. Real-time human resource costs were estimated using a time in motion analysis of a subset of residents (healthcare and security staff time required for each step of the case finding process including TST testing, reading, IGRA blood draw, testing and interpretation time). Clinical and laboratory costs were calculated using hourly salary tables for employees. Additional costs included were supplies for TST, CXR, and IGRA. On-site capital costs were assumed to be similar across case finding strategies, so were excluded. All costs were given in 2013 USD. The total cost per LTBI case identified was estimated by dividing the number of LTBI cases identified by the estimated annual cost for each testing strategy. Sensitivity analyses were performed to determine the effect of TST positivity cut-off for IGRA positivity, costs of labour in time-in-motion, and unit price of IGRA tests.			• if IGRA costs were $25: IGRA costs $11.79 more than TST • if including higher staff costs and IGRA test costs: IGRA costs $5.69 more than TST

Table D.3. Characteristics of cost-effectiveness study without an economic model

Study	Country, time period	Population	Case finding intervention(s)	Outcomes
Degner 2016 (6)	USA, **2002 to 2014**	**All residents (maximum 5,000 at one time, average of 92,517 residents per year, 86% male) at 7 detention facilities between 2002 and 2014.**	During the intake process, all new residents completed a health questionnaire and physical examination, including symptoms of TB (fever, chronic cough, weight loss). If the inmate had symptoms of active TB, they received a CXR and sputum culture, and were isolated until treatment completion or confirmation they did not have TB. Additional TB case finding depended on the year: 2002 to 2007: TST (intradermal injection of 5 U of tuberculin on arm, read 2 to 3 days after injection), positive if the diameter of the induration was between 5mm and 15mm, depending on risk factors (not specified): • if positive, CXR and further examination received • if latent TB diagnosed, standard treatment received • if active TB diagnosed, isolated and treatment received, and all contacts within the jail system tested for TB 2008 to 2014: CXR (read within 1 to 2 hours, isolated until results known): • if positive on CXR and health questionnaire, isolated and treatment received • if negative on CXR, but the inmate had symptoms of TB, TST and 3 serial sputum acid-fast bacillus tests	During 2002 and 2007, 8 TB cases were detected (1.3 cases per year, 26.7 active TB cases per 100,000 person-years), all of which entered the general population of the prison (for a median time of 27.5 days and a mean time of 44.4 days), with a mean number of exposures per case of 1,221.8 people (SD: 1,289.6 people). In total, 8,761 exposed residents were screened, and 206 were treated for LTBI. During 2008 and 2014, 37 TB cases were detected (5.3 cases per year, 105.7 active TB cases per 100,000 person-years), 9 of which (24.3%) entered the general population of the prison (for a mean time of 21.4 days, only including cases entering the general population), with a mean number of exposures per case of 568.2 people (only including cases entering the general population). In total, 2,272 exposed residents were screened, and 61 were treated for LTBI. Considering the costs of case finding interventions in exposed contacts, and treatment costs for LTBI, the case finding interventions during the intake process cost (in 2014 USD): • TST: $5,850.78 per active case of TB ($2.56 per inmate screened) • CXR: $399.11 per active case of TB ($21.35 per inmate screened)

Annexe E. Risk of bias assessments

Table E.1. QUADAS-2 risk of bias assessment

Study	1. Could the selection of patients have introduced bias?	2. Could the conduct or interpretation of the index test have introduced bias?	3. Could the reference standard, its conduct, or its interpretation have introduced bias?	4. Could the patient flow have introduced bias?	Notes
Bellin 1993 (1)	High risk	Low risk	High risk	High risk	Q1 and Q4: only 62% of those with TST results had CXRs, which may have introduced bias depending on the reasons why the CXRs were missing. Q3: Only CXR available as index test.

QUADAS-2 questions:

Domain 1: Patient selection
Was a consecutive or random sample of patients enrolled?
Was a case-control design avoided?
Did the study avoid inappropriate exclusions?
Could the selection of patients have introduced bias?
Is there concern that the included patients do not match the review question?

Domain 2: Index test(s)
Were the index test results interpreted without knowledge of the results of the reference standard?
If a threshold was used, was it pre-specified?
Could the conduct or interpretation of the index test have introduced bias?
Is there concern that the index test, its conduct, or interpretation differ from the review question?

Domain 3: Reference standard
Is the reference standard likely to correctly classify the target condition?
Were the reference standard results interpreted without knowledge of the results of the index test?
Could the reference standard, its conduct, or its interpretation have introduced bias?
Is there concern that the target condition as defined by the reference standard does not match the review question?

Domain 4: Flow and timing
Was there an appropriate interval between index test(s) and reference standard?
Did all patients receive a reference standard?
Did patients receive the same reference standard?
Were all patients included in the analysis?
Could the patient flow have introduced bias?

Table E.2. NICE Economic critical appraisal checklist risk of bias assessment, Section 1: Applicability

Abbreviations: CXR: chest X-ray, ICER: incremental cost effectiveness analysis, IGRA: interferon gamma release assay, NA, not applicable, PCR: polymerase chain reaction, QALY: Quality Adjusted Life Year, TST: tuberculin skin test, USA: United States of America

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Overall judgement	Comments
Degner 2016 (6)	Yes	Yes	Partly	Yes	Yes	Partly	No	Partly applicable	Costs per case identified, USA prisons. Q1.6: no discounted costs, as costs were directly observed over the study period, Q1.7: Costs only, no QALYs estimated
Jones 2001 (3)	Yes	Yes	Partly	Yes	Yes	Partly	No	Partly applicable	Costs per case identified, USA prisons. Q1.6: discounted at 3% not 3.5%, Q1.7: Costs only, no QALYs estimated.
Kawatsu 2020 (4)	Yes	Yes	Partly	Yes	Yes	Partly	No	Partly applicable	Costs per case identified, Japan, 2-year horizon, Q1.6: no discounted costs calculated, Q1.7: no QALYs estimated.
Kowada 2013 (5)	Yes	Yes	Partly	Yes	Yes	Partly	Yes	Directly applicable	Costs per additional QALY, Japan prisons, Q1.6: discounted at 3% not 3.5%
Nijhawan 2016 (2)	Yes	Yes	Partly	Yes	Yes	Yes	No	Partly applicable	Costs per case identified, Japan prisons, Q1.6: One-year horizon, no discounting necessary, Q1.7: no QALYs estimated

Questions for the NICE Economic critical appraisal checklist, Section 1: Applicability

1. Is the study population appropriate for the review question?
2. Are the interventions appropriate for the review question?
3. Is the system in which the study was conducted sufficiently like the current UK context?
4. Is the perspective for costs appropriate for the review question?
5. Is the perspective for outcomes appropriate for the review question?
6. Are all future costs and outcomes discounted appropriately?
7. Are quality-adjusted life years (QALYs), derived using NICE's preferred methods, or an appropriate social care-related equivalent used as an outcome? If not, describe rationale and outcomes used in line with analytical perspectives taken (item Q5 above).

Table E.3. NICE Economic critical appraisal checklist risk of bias assessment, Section 2: Study limitations

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Overall judgement	Comments
Degner 2016 (6)	NA	Yes	Yes	Partly	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Minor limitations	Q2.1: Directly observed costs and outcomes, no model presented
Jones 2001 (3)	Unclear	Unclear	Yes	Partly	Yes	Yes	Yes	Yes	No	Unclear	Unclear	Potentially serious limitations	Q2.1: The model is not well reported, difficult to appraise, Q2.2: Unclear time horizon, Q2.9: ICERs not estimated, Q2.10: Sensitivity analyses for ranges not reported (although ranges specified), Q2.11: No statement declaring conflicts of interest
Kawatsu 2020 (4)	Yes	No	Yes	Partly	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Potentially serious limitations	Q2.2: Two-year horizon, likely insufficient to estimate total costs and TB cases prevented
Kowada 2013 (5)	Yes	Yes	Yes	Partly	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Minor limitations	No serious limitations identified

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Overall judgement	Comments
Nijhawan 2016 (2)	Yes	No	Yes	Partly	Yes	Yes	Yes	Yes	Yes	Yes	No	Potentially serious limitations	Q2.2: One-year horizon, likely insufficient to estimate total costs and TB cases prevented, Q2.11: funded by QIAGEN, who make the IGRA test used in the study

Questions for the NICE Economic critical appraisal checklist, Section 2: Study limitations

1. Does the model structure adequately reflect the nature of the topic under evaluation?
2. Is the time horizon sufficiently long to reflect all important differences in costs and outcomes?
3. Are all important and relevant outcomes included?
4. Are the estimates of baseline outcomes from the best available source?
5. Are the estimates of relative intervention effects from the best available source?
6. Are all important and relevant costs included?
7. Are the estimates of resource use from the best available source?
8. Are the unit costs of resources from the best available source?
9. Is an appropriate incremental analysis presented or can it be calculated from the data?
10. Are all important parameters whose values are uncertain subjected to appropriate sensitivity analysis?
11. Has no potential financial conflict of interest been declared?

Note that in the NICE Economic critical appraisal checklist, ‘minor limitations’ is used both for studies that meet all quality criteria, and for studies that fail to meet one or more quality criteria but this is unlikely to change the conclusions about cost effectiveness.

Acronyms

Acronym	Term
AFB	acid-fast bacilli
BCG	Bacillus Calmette-Guérin
CI	confidence interval
CXR	chest X-ray
HIV	human immunodeficiency virus
ICER	Incremental cost-effectiveness ratio
IGRA	Interferon Gamma Release Assay
INH	isoniazid
IPT	isoniazid preventive therapy
LTBI	detection of latent TB infection
MDR-TB	multidrug resistant TB
MTB	mycobacterium tuberculosis
NAAT	nucleic acid amplification test
NICE	National Institute for Health and Care Excellence
PCR	polymerase chain reaction
QFT	QuantiFERON test
QUADAS-2	Quality Assessment of Diagnostic Accuracy Studies
QUALY(s)	quality-adjusted life year(s)
TB	tuberculosis
TST	tuberculin skin test
USD	US dollars ($)
WHO	World Health Organisation

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