Cost-effectiveness of interferon-gamma release assay testing for the treatment of latent tuberculosis

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The health technologies considered in this study were screening strategies for tuberculosis (TB). Five screening strategies were considered:

strategy 1 was the T.SPOT assay alone;

strategy 2 was the tuberculin skin test (TST) with a >= 5-mm cut-off;

strategy 3 was the TST with a >= 10-mm cut-off;

strategy 4 was the TST with a >= 15-mm cut-off; and

strategy 5 was the TST with a >= 10-mm cut-off followed by the T.SPOT assay for positive cases.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis.

Study population
Two hypothetical populations were considered. One comprised a group of persons aged 20 years old who were close contacts of an index case, and the second comprised close contacts aged 40 years old.

Setting
The setting was outpatient care. The economic study was carried out in Switzerland.

Dates to which data relate
The model data were derived from studies published between 2001 and 2006. The price years were 2004 and 2005.

Source of effectiveness data
The data used in the model included the sensitivity and specificity of each of the screening strategies, the effectiveness of treatment, the probability of disease with isoniazid, and mortality.

Modelling
A Markov model with a 20-year horizon and a 1-year cycle length was developed using TreeAge Pro software. The model parameters (including their justification), the authors’ calculations, and the sources of the parameters were fully...
Sources searched to identify primary studies
The sensitivity and specificity data were taken from a side-by-side comparison of the T.Spot test and the TST of close contacts. The efficacy of treatment for TB was taken from a prospective study (the design of which was not reported). The probability of disease and mortality were derived from published studies. All data were derived from Swiss sources.

Methods used to judge relevance and validity, and for extracting data
The authors did not detail their methods or the inclusion criteria used to identify appropriate studies to inform the model parameters. Where the authors did not take data directly from the published studies, they clearly reported and justified their calculations.

Measure of benefits used in the economic analysis
The measures of health benefit used were the number of active TB cases prevented and the life-years gained.

Direct costs
The direct costs to the health care payer were identified. These included the preventive costs (screening and treatment of latent TB), treatment costs (diagnosis and treatment of smear-positive TB) and the overall cost of disease. Although unit costs were specified in the paper and, in general, were derived from relevant Swiss studies, their corresponding sources were not reported. Future costs were discounted at a rate of 5% per annum. The price year was 2004.

Statistical analysis of costs
The data were treated deterministically.

Indirect Costs
Productivity costs due to sick leave were identified. National average age data were used to identify the unit cost. Future costs were discounted at a rate of 5% per annum. The price year was 2005.

Currency
Swiss francs (CHF) converted to Euros (EUR). The exchange rate was reported.

Sensitivity analysis
One-way and multi-way sensitivity analyses were undertaken to assess variability in the data. The authors stated that reasonable ranges were used.

Estimated benefits used in the economic analysis
The numbers-needed-to-treat (NNT) to prevent one TB case in both populations were reported. Only the findings for the 40-year-old cohort are presented here:

strategy 1 (T.Spot test), NNT 24 (95% confidence interval, CI: 14 to 75);
strategy 2 (TST >= 5 mm), NNT 83 (95% CI: 49 to 268);
strategy 3 (TST >= 10 mm), NNT 66 (95% CI: 41 to 171);
strategy 4 (TST >= 15 mm), NNT 34 (95% CI: 24 to 61); and
strategy 5 (TST >= 10 mm followed by T.SPOT test), NNT 24 (95% CI: 14 to 75).

Cost results
The total costs for screening 1,000 contacts in the 40-year-old cohort were:

strategy 1 (T.SPOT test), EUR 427,792;  
strategy 2 (TST >= 5 mm), EUR 801,041;  
strategy 3 (TST >= 10 mm), EUR 746,191;  
strategy 4 (TST >= 15 mm), EUR 525,889; and
strategy 5 (TST >= 10 mm followed by T.SPOT test), EUR 406,334.

Synthesis of costs and benefits
In the 40-year-old cohort, the cost-effectiveness ratio were:

strategy 1 (T.SPOT test), EUR 28,905 per TB case prevented;  
strategy 2 (TST >= 5 mm), EUR 83,442 per TB case prevented;  
strategy 3 (TST >= 10 mm), EUR 67,836 per TB case prevented;  
strategy 4 (TST >= 15 mm), EUR 43,824 per TB case prevented; and
strategy 5 (TST >= 10 mm followed by T.SPOT test), EUR 36,939 per TB case prevented.

The sensitivity analysis showed that the results were most sensitive to the cost of treatment for TB cases identified in the 20-year-old cohort, and to the probability of disease progression in the 40-year-old cohort.

Authors’ conclusions
Using the T.SPOT test, either alone or with the tuberculin skin test (TST), was a cost-effective option for screening close contacts for tuberculosis (TB).

CRD COMMENTARY - Selection of comparators
This study compared five screening strategies to identify latent cases of TB, three of which represented current Swiss practice. You should consider how these options compare with usual practice in your own setting when considering the results of this study.

Validity of estimate of measure of effectiveness
The model parameters were taken from published studies. The authors did not report their search methods or their inclusion criteria. This makes it difficult to assess the quality of the methods used to identify the studies. The authors did state that relevant Swiss data were identified and they implied that, to their knowledge, this was the best relevant evidence available. In addition to the published data, some data assumptions were required; the rationale for these assumptions was fully described in the paper.

Validity of estimate of measure of benefit
The measure of health benefit was the NNT, which will enable the results of this study to be compared with those for other TB screening options. A utility measure might have provided a more comprehensive view of all captured health
benefits.

**Validity of estimate of costs**
The study was carried out from a societal perspective and all the costs appropriate to that perspective appear to have been included. Future costs were appropriately discounted. Variability in the cost data was explored in the sensitivity analysis. The source of the unit costs was not reported and this will limit the scope for applying the findings of this study to other settings. A different price year was used for the direct and indirect costs, and this will also hinder future reflation exercises. Overall, the reporting of the cost data was adequate.

**Other issues**
The authors do not appear to have presented their results selectively and their conclusion reflected the scope of the analysis. The study was designed to assess the impact of the screening strategies in a Swiss setting. The authors did not, therefore, consider how their results could be generalised to other countries, although they did acknowledge that some cost parameters varied greatly in comparison with other countries. The authors acknowledged and reported a number of limitations to their study, the majority of which appear to have been caused by the lack of available data.

**Implications of the study**
The authors stated that their findings have important implications for health care providers and Swiss screening recommendations, but did not make any explicit recommendations.

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