Cost-effectiveness of QuantiFERON-TB test vs tuberculin skin test in the diagnosis of latent tuberculosis infection

Deuffic-Burban S, Atsou K, Viget N, Melliez H, Bouvet E, Yazdanpanah Y

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.

CRD summary
This study examined the cost-effectiveness of the tuberculin skin test (TST), the QuantiFERON-TB Gold test (QFT), and the combination of both tests, for the diagnosis of latent tuberculosis infection in adults vaccinated with Bacillus Calmette-Guerin (BCG). The TST did not provide good value for money, while the QFT was more cost-effective than both tests, and was the preferred strategy, in most simulations. The cost-effectiveness framework was conventional and well described and the authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the cost-effectiveness of the tuberculin skin test (TST), the QuantiFERON-TB Gold test (QFT), and a combination of both these tests, for the diagnosis of latent tuberculosis infection (LTBI) in adults who were vaccinated with Bacillus Calmette-Guerin (BCG) and had been in close contact with tuberculosis (TB).

Interventions
The three strategies were TST, QFT, and both. A strategy of no testing was also considered.

Location/setting
France/primary care.

Methods
Analytical approach:
The analysis was based on a decision-tree model with a lifetime horizon. The authors stated that it was carried out from the perspective of the French health care payer.

Effectiveness data:
The most appropriate estimates were selected from those available in the literature. The prevalence of LTBI and mortality data were from French sources. The accuracy of each test was from a meta-analysis of cross-sectional studies and the specificity of the tests was the key input to the model.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
Life-years were the summary benefit measure and they were discounted at a rate of 3% per annum.

Cost data:
The economic analysis included the costs of: diagnostic tests, out-patient visits, liver function tests, hospitalisations, ophthalmology visits, chest X-rays, sputum cultures, treatment with isoniazid, rifampicin, pyrazinamide, and ethambutol, TB-induced hospitalisation leading to death, and sudden severe hepatitis leading to death. These costs were from official French sources. Specifically, the hospital costs were from French diagnosis-related group (DRG) data provided by the Ministry of Health. Resource consumption was mainly based on authors' assumptions and published
studies. All costs were in Euros (EUR) and they were discounted at an annual rate of 3%. The price year was 2007.

Analysis of uncertainty:
One-way sensitivity analyses were carried out on the model inputs, using plausible ranges of values. The prevalence of LTBI and the specificity of the TST were varied to consider patients who were not BCG vaccinated. An alternative scenario considered that a positive TST was a hardening of 5mm or more (10mm in the base case).

Results
In the base case, the projected costs were EUR 417 with no testing, EUR 435 with both tests, EUR 443 with QFT, and EUR 476 with TST. The life-years were 25.030 with no testing, 25.062 with both, 25.073 with QFT, and 25.071 with TST. The incremental analysis showed that the TST was dominated by the QFT, as it was more expensive and less effective, while the incremental cost per life-year gained was EUR 560 with both tests over no testing and EUR 730 with QFT over both tests.

In the alternative scenario, TST remained dominated, combined testing was weakly dominated, and the incremental cost-effectiveness ratio of QFT over no testing was EUR 600.

The sensitivity analysis confirmed that the base-case findings were robust in reasonable scenarios. Even with a 50% reduction in its cost, the TST remained more expensive and less effective than the QFT. The results were sensitive to changes in the prevalence of LTBI and the TST specificity. At a TST specificity of 90% (60% in the base case) and a LTBI prevalence of 5% (41% in the base case), the TST was less expensive than the QFT, and the incremental cost per life-year gained with the QFT was EUR 74,340.

Authors’ conclusions
The authors concluded that the TST did not provide good value for money, while the QFT was more cost-effective than both tests combined, and was the preferred strategy, in most simulations.

CRD commentary
Interventions:
The selection of the comparators was appropriate as the available diagnostic strategies were compared. The TST was the usual diagnostic tool, while the QFT was newly available. The combination of both tests was recommended in some countries and was also considered.

Effectiveness/benefits:
The assessment of the clinical inputs was not fully reported. The accuracy of each test was from a meta-analysis of cross-sectional studies, which might not have accurately estimated their sensitivity, but an extensive sensitivity analysis was conducted to address this issue. The remaining data were from standard French sources or published sources that were not described. The summary benefit measure was survival, which was appropriate given the impact of the disease on life expectancy.

Costs:
The cost categories and the data sources were consistent with the economic viewpoint. The unit costs were reported for most items and the key resource consumption information was given, but the sources were not clearly reported. Other details, such as the price year and the use of discounting, were provided. Sensitivity analyses were conducted on the cost of the TST and the QFT. In general, the economic analysis was carried out transparently.

Analysis and results:
The results were extensively reported and an incremental approach was appropriately used to synthesise the costs and benefits and to exclude inferior strategies. Conventional discounting was applied to both the costs and the benefits. The details of the decision model were clearly presented. The uncertainty was only investigated in a deterministic analysis, which considered variations in individual model parameters. The authors acknowledged some limitations of their analysis and these mainly related to some weak clinical sources and the need for some assumptions. Generally, these assumptions were reported to be conservative against the QFT test. The TST could be preferred where there is very low LTBI prevalence and people are not BCG vaccinated, which means the TST specificity should be high.
Concluding remarks:
The cost-effectiveness framework was conventional and well described. The authors’ conclusions appear to be robust.

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