Cost-effectiveness analysis of antiretroviral drug treatment and HIV-1 vaccination in Thailand


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
The study examined the cost-effectiveness of three strategies: vaccination, highly active antiretroviral treatment and a combination of the two, for the management of HIV/AIDS in the adult population. The study demonstrated that the vaccination programme was more cost-effective than the antiretroviral drug therapies in the Thai setting. Assumptions were needed for most of the clinical outcomes used to populate the decision model. Thus, caution will be required when interpreting the authors’ conclusions.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The primary objective of the study was to examine the cost-effectiveness of three strategies for the management of the human immunodeficiency virus and acquired immune deficiency syndrome (HIV/AIDS). The strategies were vaccination, treatment and a combination of the two. The study population comprised children aged 10 years or older.

Interventions
The strategies examined were vaccination with a prime-boost regimen of recombinant Bacillus Calmette-Guerin (rBCG) vaccine and recombinant vaccinia virus DIs (rBCG prime-rDIs boost), highly active antiretroviral treatment (HAART) and a combination of the two. These strategies were compared with a do-nothing option.

Location/setting
Thailand/primary care.

Methods
Analytical approach:
This economic evaluation was based on a Markov model. The model was developed to simulate the development of disease under the four strategies in a hypothetical cohort of 10-year-old uninfected children. A lifetime horizon was considered. The authors stated that the perspective of a medical service decision-maker was adopted in the study.

Effectiveness data:
: The clinical data appear to have been derived from a selection of known, relevant studies and expert opinion. Two alternative scenarios for vaccine efficacy were considered. In scenario 1 the vaccine prevented 30% of HIV infections, while in scenario 2 the vaccine reduced progression rates to AIDS by 30%. No information about the sources of other clinical data, such as the effect of HAART on reducing disease progression, was provided. Most of the clinical estimates were based on expert opinion and assumptions. Disease progression without intervention was based on Thai statistics on HIV versus AIDS cases and mortality due to AIDS. Life expectancy was derived from a publication by the World Health Organization. The key model inputs were the effectiveness of HAART and vaccination.

Monetary benefit and utility valuations:
The sources of disability weights were not reported.

Measure of benefit:
The summary benefit measures were the disability-adjusted life-years (DALYs) and life-years (LYs). They were
estimated using the decision model. An annual discount rate of 3% was applied.

Cost data:
The health services included in the analysis were the cost for an HIV and AIDS infection patient, physician visits, travel and accommodation, HAART regimens and vaccination. The unit costs and the resource quantities were not presented separately. Most of the costs were derived from the Thai Ministry of Public Health and other health institutions in Thailand. The vaccine cost came from interviews with medical and health experts. Other costs were derived from published studies. The price year was 2000. The costs were in US dollars ($). Discounting was relevant given the long timeframe of the analysis and an annual rate of 3% was used.

Analysis of uncertainty:
A one-way sensitivity analysis was undertaken on important model inputs. The ranges of values tested in the analysis were derived from published cost-effectiveness studies from other published sources. The upper limit of cost for HAART reflected the public price in the past. A first-order Monte Carlo simulation was also performed in order to obtain 95% confidence intervals (CIs) for the estimated DALYs.

Results
In comparison with no treatment, the incremental cost per patient was $6.9 with vaccination in scenario 1, $20.0 with vaccination in scenario 2, $48.9 with HAART and $131.4 with the combined strategy.

The expected LYs and DALYs with the different strategies were not reported.

The incremental cost per LY gained over no treatment was $99 with vaccination in scenario 1, $802 with vaccination in scenario 2, $707 with HAART and $315 with the combined strategy.

The incremental cost per DALY gained over no treatment was $75 with vaccination in scenario 1, $825 with vaccination in scenario 2, $610 with HAART and $267 with the combined strategy.

The sensitivity analysis identified the change in new HIV infection rates and the cost of HAART as the most influential model inputs, especially for the vaccination strategies. Changes in other model inputs did not substantially alter the ranking of strategies.

Authors' conclusions
The authors concluded that the vaccination programme was more cost-effective than the antiretroviral drug therapies for the management of HIV/AIDS in the Thai setting.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear and appropriate in that all possible prevention and treatment strategies were considered.

Effectiveness/benefits:
The authors did not describe the approach used to identify the primary studies, nor did they give any information about the sources of these data. Thus, it is not possible to judge the validity of the clinical estimates. It seems that most of the clinical evidence was based on assumptions and expert opinion. Given the uncertainty surrounding the estimates used in the model, these inputs were extensively investigated in the sensitivity analysis. Similarly, the derivation of the benefit measures was unclear and the authors performed a Monte Carlo simulation on the expected DALYs in order to address uncertainty around these parameters.

Costs:
The analysis of the costs appears to have been consistent with the authors' stated perspective. However, the costs were presented as macro-categories and a detailed breakdown of the cost items was not given. Furthermore, the authors did not describe accurately the sources used, especially when the costs were obtained from published economic evaluations. This reduces the transparency of the study. Other details such as the price year and the use of discounting were
reported.

Analysis and results:
The synthesis of the costs and benefits was clear in its performance and presentation. The sensitivity analysis addressed the key aspects of uncertainty, which were investigated using both deterministic and probabilistic techniques. The results of the analysis were presented clearly. The authors stated that, in general, their findings were in agreement with previous reports. Some limitations to the generalisability of the study findings were pointed out. First, the target population was not specified sufficiently for the implementation in real-world programmes. Second, the simulation model might not reflect actual vaccination programmes. Third, the impact of the programmes on people outside of the cohort or target population was not considered.

Concluding remarks:
The study was, in general, characterised by assumptions with respect to the clinical estimates used to populate the decision model. Thus, caution will be required when interpreting the authors' conclusions.

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Other publications of related interest


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