Cost-effectiveness of genotypic antiretroviral resistance testing in HIV-infected patients with treatment failure
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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.

CRD summary
This study evaluated the clinical effect, cost and cost-effectiveness of human immunodeficiency virus treatment optimisation using genotypic antiretroviral resistance testing (GART) compared with expert opinion, for patients with antiretroviral treatment failure. The authors concluded that GART was cost-effective and beneficial to society. The methodology seems to have been appropriate, with some minor limitations, and was clearly and transparently reported. The conclusions reached by the authors appear to be appropriate.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The aim was to evaluate the clinical effect, cost and cost-effectiveness of human immunodeficiency virus (HIV) treatment optimisation using genotypic antiretroviral resistance testing (GART) compared with expert opinion, in patients with antiretroviral treatment failure.

Interventions
GART was an expensive technology recommended, in patients with antiretroviral treatment failure, for distinguishing between antiretroviral drugs to which HIV has become resistant and compounds that will effectively suppress viral replication, and thus determine the best treatment. The definitions of treatment failure were clearly provided. The alternative was to base the treatment decisions on clinical judgement without GART.

Location/setting
Switzerland/primary and secondary care.

Methods
Analytical approach:
A state-transition model was used to synthesise the data for the first two years and then for the subsequent years. A lifetime horizon was used. The authors stated they took both a health care and a societal perspective.

Effectiveness data:
The natural history model parameters were mainly based on the Swiss HIV Cohort Study, which had a cohort of over 14,000 people, with a mean age of 33 years and 80% men (Ledergerber, et al. 1994, see ‘Other Publications of Related Interest’ below for bibliographic details). The relative effectiveness of GART compared with expert opinion was derived from published randomised trials.

Monetary benefit and utility valuations:
The utility values were derived from a study on the quality of life of patients enrolled in the Swiss HIV Cohort Study (Zinkernagel, et al. 1999, see ‘Other Publications of Related Interest’ below for bibliographic details). Visual analogue scale data were transformed to standard gamble utilities, and regression analysis was used to derive the utilities for the different health states. The disutilities of experiencing a disease indicating acquired immune deficiency syndrome were derived from a published meta-analysis. An adjustment was made to exclude any income effects of HIV disease in the QALY estimation, since productivity losses were included in the cost analysis.
Measure of benefit:
Life-years and quality-adjusted life-years (QALYs) were the measures of benefit. These were discounted at different rates according to the health care (4%) or societal (2%) perspective.

Cost data:
For the health care perspective, only those costs due to health care resource consumption were included, using previously reported micro-costing data. These included antiretroviral therapy, drugs to treat or prevent opportunistic diseases and other drugs, ambulatory costs, in-patient costs, and GART costs. For the societal perspective, the number of hours a patient worked in each health state was valued at an average Swiss wage rate. All costs were expressed in 2005 US dollars ($). Benefits were discounted at different rates according to the health care (4%) or the societal (2%) perspective.

Analysis of uncertainty:
Probabilistic sensitivity analysis was used to evaluate the uncertainty around the cost and effect estimates and the methods were adequately reported. The joint distribution of the resulting incremental costs and effects was summarised in graphs of cost-effectiveness 95% credibility intervals and acceptability curves.

Results
Health care perspective: GART showed an increase in discounted life-expectancy of three weeks and quality-adjusted life-expectancy of two weeks. The discounted health care costs were $420,900 with GART and $419,200 without. This corresponded to an expected cost-effectiveness ratio of $35,000 per QALY gained. At a willingness-to-pay of $35,000 or more per QALY, GART was the preferred treatment.

Societal perspective: GART versus expert opinion showed an increase in discounted life-expectancy of three weeks and quality-adjusted life-expectancy of four weeks. The discounted health care costs were $551,000 with GART and $549,000 without, but as patients on GART incurred more productivity costs (discounted income of $401,000 versus $399,000), GART was a less costly strategy (incremental saving of $200) and it was dominant, which means it was more effective and cheaper. At a willingness-to-pay of $850 or more per QALY gained, GART was the preferred option.

Authors’ conclusions
The authors concluded that GART was good value for money and beneficial to society, and that it should be offered to all patients who can benefit from it. The study was conducted in Switzerland, but the authors suggested that it was also relevant for other settings, such as the USA.

CRD commentary
Interventions:
The reporting of the interventions was adequate.

Effectiveness/benefits:
The methodology used to derive the utilities for the different health states was not fully described and an assessment of the validity of these values is therefore not possible.

Costs:
The costs were clearly and transparently described.

Analysis and results:
The model structure was reported well along with all the relevant details and modelling assumptions. The authors conducted an incremental analysis and the results were adequately presented. Sensitivity analyses were conducted on the modelling assumptions and parameters, which enhances the generalisability of the findings. The authors provided a thorough discussion on the limitations and weaknesses of their study.

Concluding remarks:
Although the study was subject to some minor limitations, the methodology appears to have been appropriate and was
clearly and transparently reported. The conclusions reached by the authors appear to be appropriate.

**Funding**
Supported by the Swiss National Science Foundation, the Stiftung Forschung Infektionskrankheiten Basel, and the Swiss HIV Cohort Study.

**Bibliographic details**

**PubMedID**
17245449

**DOI**
10.1371/journal.pone.0000173

**Original Paper URL**
http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0000173

**Other publications of related interest**


**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Anti-HIV Agents /pharmacology /therapeutic use; Clinical Trials as Topic; Cost-Benefit Analysis /economics; Disease Progression; Drug Resistance, Viral /genetics; Genotype; HIV Infections /drug therapy /economics; HIV-1 /drug effects /genetics; Health Care Costs; Humans; Life Expectancy; Models, Theoretical; Quality of Life; Treatment Failure

**AccessionNumber**
22008102337

**Date bibliographic record published**
31/03/2009

**Date abstract record published**
27/01/2010