Cost-effectiveness of an intervention to improve adherence to antiretroviral therapy in HIV-infected patients


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 use of a home nurse intervention combined with standard care was compared with standard care alone in helping improving adherence, and thus increasing virologic suppression, in patients with the human immunodeficiency virus (HIV). The nurse intervention included two 1-hour home visits per week for the first 6 weeks of antiretroviral therapy (ART). Standard care consisted of ART, laboratory monitoring, preventive primary care and the control of infections, adverse events and diseases.

Type of intervention
Treatment and adherence interventions.

Economic study type
Cost-utility analysis.

Study population
The study population comprised (HIV) patients who were commencing or altering ART regimens or who had a recognised history of adherence problems.

Setting
The setting was the community. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness data used to populate the model came from studies published between 1997 and 2005. The resource data appear to have been collected alongside the randomised controlled trial (Hirschhorn et al. 2003) between September 2000 and April 2003. The price year was 2004.

Source of effectiveness data
The clinical parameters associated with the programme included:

the transition probabilities for the different stages of HIV,

CD4 cell count decline over time,

the risk of opportunistic infections and risk of death, and

efficacy of the treatment (i.e. the proportion of patients with suppressed HIV RNA) at a given time.
Modelling
A computer-based state transition model of HIV disease, the "Cost-Effectiveness of Preventing AIDS Complications-CEPAC" model, was used to model the long-term cost-effectiveness of HIV interventions. The model was based on one developed by Goldie et al. 2003, Freedberg et al. 2001 and Weinstein et al. 2001 (see 'Other Publications of Related Interest' below for bibliographic details). It was modified to integrate data from a recently completed randomised trial of an intensive nursing intervention (Hirschhorn et al. 2003, see 'Other Publications of Related Interest' below for bibliographic details). The time horizon, cycle length and a number of modelling assumptions were reported in full, whereas the parameters used in the model and the health states were not.

Sources searched to identify primary studies
The efficacy of each antiretroviral regimen was derived from a randomised controlled trial and from further trials and economic evaluations. The monthly risk of opportunistic infections and death were derived from a published multi-centre cohort study (Freedberg et al. 1998, see 'Other Publications of Related Interest' below for bibliographic details).

Methods used to judge relevance and validity, and for extracting data
Data incorporated into the model were mainly obtained from a randomised controlled trial that directly compared the health technologies used in the current study. Data from further trials were also included in the model. However, the process used to identify the data was not reported. No inclusion criteria were specified for any parameters and the method used to select the estimates was not discussed.

Measure of benefits used in the economic analysis
The measure of benefit was the quality-adjusted life-years (QALYs). Quality of life weights were derived from a published study. The benefits were discounted at an annual rate of 3%.

Direct costs
The authors reported that the costing methods were detailed elsewhere (Schackman et al. 2005, see 'Other Publications of Related Interest' below for bibliographic details). The direct health intervention costs included in the analysis were labour costs for adherence services (including transportation and visit costs), participant incentive payments, adherence tools used at the site of encounter, and trainer and trained time for staff adherence training sessions. Resource use was determined using a micro costing methodology. Neither the source of the unit costs nor their values were reported. The costs were reported as the average cost per patient. The costs were appropriately adjusted for inflation using the medical component of the Consumer Price Index and were reported for the price year 2004. Discounting was performed at an annual rate of 3%.

Statistical analysis of costs
The cost data appear to have been treated deterministically.

Indirect Costs
In line with the perspective adopted, productivity losses were included in the analysis. These accounted for the patients' time spent receiving the intervention and for unpaid peer provider time. The resources used and costs were derived from a published study (Schackman et al. 2005), but the quantities of resource use were not reported separately. The costs were appropriately adjusted for inflation: the price year was 2004 and all costs were discounted at an annual rate of 3%.

Currency
US dollars ($).
Sensitivity analysis
Parameter uncertainty was investigated using various one-way sensitivity analyses. The key parameters investigated were:

- the impact of the intervention on antiretroviral efficacy,
- the duration of the effect of the intervention,
- the availability of ensuing treatment regimens (i.e. third- and fourth-line regimens), and
- initial and overtime costs of the intervention.

Neither the methods nor the rationale used to determine the ranges over which variables were tested were reported. No expected-value-of-information analysis was performed.

Estimated benefits used in the economic analysis
The mean projected per person survival quality-adjusted life-months were 100.9 for the nurse adherence intervention and 94.5 for standard care.

Cost results
The average lifetime projected cost was $261,300 for the nurse adherence intervention and $253,800 for standard care.

Synthesis of costs and benefits
The nurse intervention resulted in a cost of $14,100 per QALY gained compared with standard care.

The sensitivity analyses indicated that the results were most sensitive to changes in the impact of the adherence intervention on the efficacy (viral suppression) of ART. If the intervention led to only a 30% increase in suppression compared with the standard arm (63% in the base-case analysis), it resulted in a cost-effectiveness ratio of $16,700 per QALY gained. The exclusion of the availability of third- and fourth-line regimens for patients who failed second-line therapy resulted in an incremental cost of $19,800 per QALY gained when the intervention was compared with standard care alone.

Authors' conclusions
"Adherence interventions with modest effectiveness are likely to provide long-term survival benefit to patients and to be cost-effective compared with other uses of HIV (human immunodeficiency virus) care funds."

CRD COMMENTARY - Selection of comparators
A justification was provided for the technologies compared. Standard care would appear to represent current practice in the authors' setting. However, different existing interventions for improving adherence with ART were not accounted for in the analysis, thus rendering this study a partial analysis.

Validity of estimate of measure of effectiveness
Although the data used in the model were mainly obtained from a randomised trial, other published studies were also used. No systematic search for data was reported. The authors did not report any search methods or inclusion criteria. The design of the randomised trial was explicitly reported but, given the information reported in this paper, it was not possible to judge the validity of the data obtained from the different studies.

Validity of estimate of measure of benefit
The measure of benefit used was the QALYs. Quality of life weights were derived from a published study and details
of the valuation method were not reported. The use of QALYs will enable comparisons to be made with other cost-utility analyses of health care programmes.

**Validity of estimate of costs**

The analysis of the costs was performed from a societal perspective. It appears that all the categories of cost relevant to that perspective have been included in the analysis. The authors referred to a separate paper (Schackman et al. 2005) for details of the costing methodology. The sources of the price information and costs were not specified. It is therefore not possible to comment on the generalisability of the costing. The fact that the study was undertaken in the USA would imply that you, as the reader of this abstract, should consider whether US costs are likely to be similar to the costs in your own health setting. The costs were appropriately adjusted for inflation and discounting was performed. The authors evaluated uncertainty in the cost data using one-way sensitivity analyses, but the methods used to determine the ranges over which the variables were tested were not specified.

**Other issues**

The authors compared their findings with those from another study and found the results to be inconsistent. However, a satisfactory discussion of this was not provided. Although the authors acknowledged variation in patient populations, the impact of a different patient population (i.e. treatment-naive patients) on the economic results was not investigated in the sensitivity analysis. The authors do not appear to have presented their results selectively and their conclusions appear to have reflected the scope of the analysis. The authors mentioned several limitations to their study. First, the follow-up period was considered to be short. Second, the study evaluated immunologic and virologic outcomes instead of clinical outcomes. Finally, the randomised trial from which most of the effectiveness data were derived had only a small sample size, which might have introduced uncertainty into the results.

**Implications of the study**

The authors endorse the financial support of adherence interventions from third-party payers. They noted the lack of robust evidence on the efficacy of adherence interventions and suggested this as an area for further research.

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**Bibliographic details**


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**Other publications of related interest**

Because readers are likely to encounter and assess individual publications, NHS EED abstracts reflect the original publication as it is written, as a stand-alone paper. Where NHS EED abstractors are able to identify positively that a publication is significantly linked to or informed by other publications, these will be referenced in the text of the abstract and their bibliographic details recorded here for information.


Hirschhorn LR, Ruhlmann L, Katz C, et al. Randomized study comparing addition of home nurse to a multidisciplinary adherence program to improve success with HAART in 2 community health centers (CHC) (abstract). International Conference on Antimicrobial Agents and Chemotherapy; 2003; Washington (DC), USA.


**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Adult; Anti-HIV Agents /administration & dosage /therapeutic use; Computer Simulation; Cost-Benefit Analysis; Female; HIV Infections /drug therapy /nursing; Health Care Costs /statistics & numerical data; Humans; Male; Middle Aged; Models, Statistical; Patient Compliance; Sensitivity and Specificity

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