Long-term impact of highly active antiretroviral therapy on HIV-related health care costs

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
Highly active antiretroviral therapy (HAART) of different levels of intensity was used in patients with human immunodeficiency virus (HIV) infection.

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population consisted of HIV-infected men. The specific inclusion and exclusion criteria were not reported.

Setting
The setting was primary and secondary care. The economic study was conducted at the Dallas Veterans Affairs Medical Centre, Texas, USA.

Dates to which data relate
The effectiveness and resource use data related to the period January 1995 to June 1998. The date to which the cost data related was not reported.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was carried out retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
All HIV-infected men (approximately 300) treated at the Dallas Veterans Affairs Medical Centre were included in the analysis. The demographics of the patients were not provided. The study sample appears to have been appropriate as it comprised the whole study population treated in the medical centre.

Study design
This was a single-centre trend cohort study comparing the use and the costs of health services of HIV-infected individuals undergoing different intensities of antiretroviral therapy. The different intensities of therapy were usually...
provided during different study periods. A comparison group of patients was not explicitly considered, since the change in the effectiveness outcomes was assessed within the same patient cohort. The study was carried out over four time periods. These were January 1995 to October 1995, November 1995 to August 1996, September 1996 to July 1997, and August 1997 to June 1998. Viral load testing was available after October 1996. The patients were followed for 44 months, but details on the losses during follow-up were not reported.

Analysis of effectiveness
The outcomes analysed were the numbers of hospital days, HIV clinic visits, emergency room visits, and non-HIV-related visits. The proportion of patients achieving a viral load of less than 500 copies/mL and less than 5,000 copies/mL was also assessed.

Effectiveness results
The HAART intensity, as measured by the number of antiretroviral medications dispensed per patient, was increasing from early 1996 to the end of the study period. By June 1998, almost all of the patients were treated with triple combination anti-HIV therapy. The number of antiretroviral drugs dispensed per patient was 2.8, and 90.4% of the patients received protease inhibitors. Twenty-two per cent of the patients were treated with non-nucleoside reverse transcriptase inhibitors.

The mean monthly hospital days decreased from an average of 102 days per 100 patients during the first quarter, to an average of 35 days per 100 patients in the last quarter, (p<0.01).

The number of visits to HIV clinics decreased from 97 per 100 patients to 55 per 100 patients, (p<0.01).

The number of visits to emergency rooms also decreased, from 15 per 100 patients in the first quarter to less than 3 per 100 patients in the third and fourth quarters, (p<0.01).

Non-HIV-related outpatient visits initially decreased but then returned to baseline levels by the fourth quarter.

The proportion of patients with a viral load below the level of detection increased from 21% in October 1996 to 47% in June 1997, (p=0.014).

The proportion of patients with a viral load below 5,000 copies/mL increased from 46 to 66%, (p=0.007), during the same period.

Clinical conclusions
The increase in the intensity of HAART was associated with decreased hospitalisation and outpatient services, and with increased proportions of patients with viral loads of less than 500 copies/mL and less than 5,000 copies/mL.

Measure of benefits used in the economic analysis
The measures of benefits used in the economic analysis were the proportions of patients each month with viral loads of less than 500 copies/mL and less than 5,000 copies/mL.

Direct costs
The direct costs analysed included the inpatient and outpatient costs (from the Fiscal Service of the Dallas Veterans Affairs Medical Centre) and the costs of antiretroviral medications (from the Immunology Case Registry). The health service costs included the numbers of infectious disease clinic visits, emergency room visits, other medical and surgical clinic visits, and the number of hospital days and antiretroviral therapy. The cost/resource boundary adopted was not explicitly stated, but appears to reflect that of the medical centre providing the treatment. The unit costs and the quantities of resources were not reported separately. Discounting was unnecessary since the duration of the study periods was less than one year. No price year was reported.
Statistical analysis of costs
Log-transformation of the cost data was performed. The differences between the monthly averages for each of these parameters for the four treatment periods were compared using a one-way analysis of variance. The relationship between the cost of antiretroviral medication and the total cost of achieving a viral load of less than 500 copies/mL was analysed through linear regression.

Indirect Costs
No indirect costs were analysed.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
The proportion of patients with a viral load below the level of detection increased from 21% in October 1996 to 47% in June 1997, (p=0.014).

The proportion of patients with a viral load below 5,000 copies/mL increased from 46 to 66%, (p=0.007), during the same period.

Cost results
The total cost per patient per month decreased from $1,905 in the first quarter to $1,090 in the third quarter, but increased to $1,349 in the last quarter.

The total monthly cost per patient in the last quarter remained below the baseline, (p<0.01).

The inpatient costs per patient per month decreased from $1,257.51 (first quarter) and $1,194.44 (second quarter) to $431 in the third quarter and $466 in the fourth quarter, (p<0.01 for all comparisons).

The costs of outpatient visits (exclusive of antiretroviral costs) decreased initially but had increased to baseline by the fourth quarter.

The monthly per patient cost of antiretroviral agents increased from $79 in the first quarter to $518 in the last quarter, (p<0.01).

Synthesis of costs and benefits
An average cost-effectiveness analysis was carried out to combine the costs and the benefits of the intervention. The cost of achieving a viral load of less than 500 copies/mL decreased from $4,438 to $2,669 per patient per month. However, this did not reach statistical significance, (p=0.181).

There was no change in the cost of achieving a viral load of less than 5,000 copies/mL per patient per month, (p=0.84).

There was a weak inverse relationship between the increasing antiretroviral agent costs and the cost of achieving a viral load of less than 500 copies/mL, (p=0.04).

Authors' conclusions
The costs associated with human immunodeficiency virus (HIV) initially decreased, but then increased as the
proportion of patients receiving protease inhibitor therapy increased.

**CRD COMMENTARY - Selection of comparators**
The authors chose to compare the impact of different intensities of HAART on HIV costs and service use. They justified this on the grounds that it was a necessary step towards deciding on the most cost-effective therapy for HIV-infected individuals. You should decide whether the comparator represents current practice in your own setting.

**Validity of estimate of measure of effectiveness**
The measure of effectiveness was based on a trend analysis, which could have affected the validity of the estimates. The study sample seems to have been appropriate for the study population, but the analysis of the impact of medications in different periods of time could have introduced bias in the baseline characteristics. Details of the cohort in each study period were not provided. The patient cohort used in the analysis changed during the course of the study as new patients treated at the clinic were progressively entered into the database. These issues tend to limit the internal validity of the effectiveness analysis.

**Validity of estimate of measure of benefit**
The measure of benefit, in terms of the proportions of patients each month with a viral load of less than 500 or 5000 copies/mL is an intermediate health benefit.

**Validity of estimate of costs**
The perspective from which the analysis was conducted was unclear. However, if the cost/resource boundary adopted was that of the clinic, then all the categories of costs relevant to the health care provider were included in the analysis. The major costs and categories were reported separately, but the unit costs were not reported. The date to which the prices refer was not reported, which makes reflation exercises to other settings problematic. Sensitivity analyses to investigate the uncertainty in the results were not performed.

**Other issues**
The authors made appropriate comparisons of their findings with those from other studies. The issue of generalisability to other settings was partially addressed. The authors observed that those hospitals with lower inpatient HIV costs or high outpatient HIV costs may not observe the dramatic savings. The study considered HIV-infected men and this was reflected in the authors’ conclusions.

**Implications of the study**
The high-intensity HAART proved to be a cost-effective intervention for HIV-infected patients. However, caution should be taken when assessing the implication of the study, due to the methodological limitations highlighted. The authors suggest that HIV-related costs will continue to rise as patients start failing the existing antiretroviral therapies. Formal evaluations of the cost-effectiveness of HAART should be performed.

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None stated.

**Bibliographic details**

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