Comparing total health care costs and treatment patterns of HIV patients in a managed care setting
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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.

Health technology
The study analysed the effect of treating patients infected with the human immunodeficiency virus (HIV) according to the 1998 guidelines of the Department of Health and Human Services (DHHS). These guidelines were referred to as highly active antiretroviral therapy (HAART). The HAART guidelines were based on the strength of the current information on clinical trials and/or expert opinion. Possible combinations of medications used in practice were categorised as preferred, acceptable, not generally recommended, and not recommended combinations.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised all continuously enrolled HIV patients aged 18 years or older at the start of the study, who had both prescription and medical claims data for the study period. Exclusion criteria specified that participants must not be pregnant during the study period because the HAART guidelines for these patients might differ at the discretion of the physician. Patients were identified as HIV positive on the basis of having received at least one antiretroviral prescription during the study period.

Setting
The setting was a large health plan located in California, USA. The economic study was carried out in the USA.

Dates to which data relate
This study was limited to an analysis of antiretroviral medication prescription claims, and their corresponding medical claims, during an 18-month period abstracted from the administrative claims data from February 1998 to July 1999. The health care costs were calculated using paid claims files from the same period at the average wholesale price. The price year 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 undertaken on the same patient sample as that used in the effectiveness study.
Study sample
The study sample included 1,791 health plan members who met the inclusion criteria. Power calculations were not reported. From this sample, 980 (54.7%) patients were identified as receiving appropriate HAART and 811 (45.3%) were identified as receiving inappropriate HAART. Patients in the HAART group were younger (42.1 versus 43.3 years; p=0.02), more likely to be male (96.4% versus 90.6%; p=0.0001), had fewer co-morbidities (chronic disease score 3.50 versus 3.91; p=0.0006), and were more adherent to treatment (Medication Possession Ratio, MPR 89.55% versus 84.43%; p=0.0001). Other demographic and clinical characteristics did not differ between the groups at baseline.

Study design
This was a retrospective, cross-sectional study using medical and pharmacy claims data from a large health plan. The health plan represented health care services provided through health maintenance organisations, preferred provider organisations and physician groups to approximately four million members annually.

Analysis of effectiveness
The primary health outcome used was the time to inpatient hospitalisation, a proxy for clinical outcome. Univariate and multivariate statistical tests were performed to analyse differences in demographic characteristics and the adjusted intervention effectiveness. To control for other factors, patient medication adherence, intensity of medical care, and the presence of co-morbidities and chronic disease were also considered in the study. No blinding of the outcome assessment was reported.

Effectiveness results
A figure using survival analysis showed that patients appropriately treated with HAART had a significantly longer time to inpatient hospitalisation, although the median times and ranges were not reported for the two groups.

The analysis revealed that older age, AIDS-defining illness, greater co-morbidities, lower medication adherence, and lack of use of HAART guidelines contributed to a shorter time to inpatient hospitalisation.

The study showed that for younger age, male patients, those with AIDS-defining illness, lower chronic disease score and better medication adherence, there was a higher probability of the patient having received treatment according to HAART guidelines.

Adherence to medication (each increase of one point in the MPR) resulted in a 1% reduction of risk for inpatient hospital admission.

An AIDS-defining illness was the biggest predictor of requiring inpatient hospitalisation (risk ratio 2.16, confidence interval: 1.703 - 2.731; p=0.0001) versus no AIDS-defining illness.

The longest time to event (inpatient hospitalisation) occurred in patients following HAART guidelines. Those not treated with HAART were significantly more likely to experience an inpatient hospitalisation (20% for HAART appropriate users versus 27% for HAART inappropriate users; p=0.0001).

Clinical conclusions
Treatment with HAART guidelines was associated with longer time to inpatient admission when controlling for other factors. It appeared that HIV patients treated with appropriate HAART guidelines might be more likely to postpone the time to acute inpatient care than those patients who were not treated following the guidelines.

Measure of benefits used in the economic analysis
No summary measure of benefit was used in the economic evaluation. In effect, a cost-consequences analysis was performed.
Direct costs
The total health care costs were defined as the sum of the medical and pharmacy costs per patient per month using paid claim files. Medical claims included inpatient hospitalisation, outpatient hospitalisation, office visits, home health care visits, nursing home facility, ambulance and hospice claims. The costs were defined as the actual cost incurred by the payer, and all prescription costs were calculated using the average wholesale price for each prescription. Discounting was not carried out, which was appropriate given the short-term horizon of the study. The quantities and the costs were, in part, reported separately. The quantities and the costs were estimated from actual data. Resource use and medical cost data were collected from administrative claims files. The prescription costs data and the price year were not reported.

Statistical analysis of costs
The costs were treated stochastically and appropriate statistical tests were carried out. All the tests were two-tailed and \( p<0.05 \) was considered significant. The total health care costs, total medical costs and pharmacy expenditures were non parametric, consequently they were normalised using a natural log transformation before being included in the multivariate analysis.

Indirect Costs
No indirect costs were reported.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was reported.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The univariate analysis showed that the use of HAART guidelines was associated with higher total health care costs ($30,472 versus $30,340; \( p=0.0001 \)). The total medical costs were significantly lower when appropriate HAART guidelines were met ($5,638 versus $8,113; \( p=0.0289 \)), while the total drug costs were significantly higher ($24,834 versus $22,227; \( p=0.0001 \)).

Using a multivariate analysis, male gender, AIDS-defining illness, greater chronic disease score, greater average MPR, specialist physician type and following HAART guidelines were associated with increased total health care expenditures. This was explained by a statistically significant impact of treatment according to HAART guidelines on lowering total medical expenditures and increasing total prescription expenditures.

Synthesis of costs and benefits
Not relevant.

Authors’ conclusions
In the short term, there was an increase in pharmaceutical and total health care costs in patients who received appropriate treatment according to the highly active antiretroviral therapy (HAART) guidelines, even after controlling for other variables that could impact on the costs. In addition, patients following HAART treatment guidelines forestalled hospitalisation compared with those who were not treated according to HAART guidelines. Patient
characteristics associated with not using HAART guidelines were older age, females, those without an AIDS-defining illness, more co-morbid conditions and lower medication adherence. These patients might be at risk for poorer outcomes.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparator used. It reflected standard practice in the authors' setting. Also, following the HAART guidelines for HIV-infected patients may be likely to lengthen the time to acute inpatient care. You should judge whether these strategies are relevant in your own setting, or whether other comparators from other drug classes or therapeutic options could also be relevant.

Validity of estimate of measure of effectiveness
The study was based on a retrospective analysis, which may be prone to bias and confounding, thus limiting the internal validity of the comparison. Though power calculations were not reported, the sample size was large and should have been appropriate to detect differences between treatment modalities. Blinding of the outcome assessment, which could reduce potential bias, was not reported. However, in an attempt to deal with some of these issues, the authors reported that statistical analyses were undertaken to account for potential biases and confounding factors. Time to inpatient admittance was considered as a proxy for patient outcomes, although a quality of life measure may have better reflected the effectiveness of the two interventions.

Validity of estimate of measure of benefit
No summary measure of benefit was derived. The reader is therefore referred to the comments in the 'Validity of estimate of measure of effectiveness' field (above). The limitations of the study design (mentioned above) apply equally to this section.

Validity of estimate of costs
According to the authors, the cost analysis was performed from the perspective of the third-party payer. There was little detail on the methodology of the cost estimation. The cost categories were not reported in detail and any omission might have affected the authors’ conclusions. In addition, the costs and the quantities were not reported separately, which would not enable the analysis to be easily extrapolated to other settings. Although it was stated that the analysis was based on actual data, the sources of the cost and price data were not reported. All these factors could affect the robustness and the reproducibility of the cost results. Statistical analyses of the costs and effectiveness data were reported. Discounting was not necessary since all the costs were incurred during an 18-month period. The price year was not reported, which will present difficulties in terms of any future reflation exercises.

Other issues
The authors compared their findings with those from other studies and, in general, found similar clinical findings. However, the cost findings differed from those of other studies, mainly because of variations in drugs prices and hospital expenditures. The authors addressed the issue of generalisability of the results to other settings, especially in the economic evaluation. They acknowledged specific study limitations such as the retrospective design, the population characteristics, the use of claims data, the average wholesale price used, patient dropouts because of the requirement for continuous enrolment, the lack of laboratory data, and the short timeframe of the study.

Implications of the study
The finding that a longer time to inpatient hospital admission is associated with appropriate HAART guideline use is relevant for both the provider and the health plan. The analysis identified certain patient groups that might be at risk for inappropriate drug use. These groups of individuals could be targeted for intervention to improve outcomes, such as reduced costs and longer time to hospitalisation. Prospective studies specifically designed to evaluate this question are probably not currently feasible on ethical and practical grounds, as HAART guidelines are the standard of care.
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