Effectiveness and cost-effectiveness of strategies to expand antiretroviral therapy in St Petersburg, Russia

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 compared four treatment strategies for treating human immunodeficiency virus (HIV)-infected patients with highly active antiretroviral therapy (HAART).

The injection drug user (IDU)-targeted treatment strategy assumed that 80% of infected, treatment-eligible IDUs and 1% of infected, treatment-eligible non-IDUs received HAART.

The non-IDU-targeted treatment strategy assumed that no infected IDUs and 80% of infected, treatment-eligible non-IDUs received HAART.

The untargeted treatment strategy assumed that 50% of all infected, treatment-eligible IDUs and non-IDUs received HAART.

The optimistic untargeted treatment strategy assumed that 80% of all infected, treatment-eligible IDUs and non-IDUs received HAART.

Type of intervention
Treatment.

Economic study type
Cost-utility analysis.

Study population
The study population comprised IDUs and non-IDUs, aged 15 to 49 years, in St. Petersburg, Russia.

Setting
The setting was not explicitly stated and it was unclear from the context of the original paper. The economic study was carried out in St. Petersburg, Russia.

Dates to which data relate
The effectiveness data were derived from studies published between 1992 and 2005. Some of the resource use data were derived from studies published between 2001 and 2005. The price year was not reported.

Source of effectiveness data
The clinical effectiveness and epidemiological parameters used in the model included:

the HIV prevalence among IDUs and non-IDUs;
the annual average number of injections, the percentage of shared injections, the probability of infection transmission, and the reduction in the rate of infection by injection drug use if no HAART;

the annual number of new sexual partners, the percentage of IDU sexual partnerships with another IDU, the percentage of condom use partnerships, condom effectiveness, and the reduction in infectivity by sexual contact if no HAART; and

the rate of progression through disease states for the HIV-infected.

Modelling
A dynamic compartmental model (state-transition model) was developed with a time horizon of 20 years. In order to adequately evaluate the effects of the interventions on the study population, state-transition probabilities were defined for twelve population groups based on IDU or non-IDU, HIV status and treatment status. The authors stated that the details of the model could be obtained from the corresponding author on request.

Sources searched to identify primary studies
The clinical effectiveness and epidemiological data were derived from a number of published studies. The design of the studies was not clear.

Methods used to judge relevance and validity, and for extracting data
It was unclear whether a systematic review of the literature was performed to obtain the data. The methods of the review were not provided in this paper. The authors did not report the selection criteria or methods for the estimates. In addition, they assumed that both IDUs and non-IDUs experienced similar disease progression rates.

Measure of benefits used in the economic analysis
The summary benefit measure used was the quality-adjusted life-years (QALYs). These were calculated in the model. The source of the utility data was not stated. The benefits were discounted at an annual rate of 3%.

Direct costs
The analysis of the costs appears to have been carried out from the perspective of the health care system, although the authors did not explicitly report this. The cost categories included the costs of HAART, the outreach, counselling and adherence interventions, and health care. The unit costs and the resource quantities were not presented separately. Resource use and most costs were estimated on the basis of a published study. The costs of counselling and adherence interventions and additional IDU services were estimated from expert opinion. All costs were incurred over a 20-year time horizon, with the exception of health care costs which were considered for lifetime. An annual discount rate of 3% was applied. The price year was not reported.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
No productivity costs were included in this analysis.

Currency
US dollars ($).

Sensitivity analysis
Extensive univariate sensitivity analyses were carried out on all model inputs to investigate the impact of uncertain parameters used in the model on the cost-effectiveness estimates.

**Estimated benefits used in the economic analysis**
All of the results referred to the cohort of 212,704 HIV infections over 20 years, of which 110,172 were among IDUs and 102,532 among non-IDUs.

The QALYs (1,000s) were:
- 75,249 with the status quo,
- 75,893 with the IDU-targeted treatment strategy,
- 75,656 with the non-IDU-targeted treatment strategy,
- 75,880 with the untargeted treatment strategy and
- 76,200 with the optimistic untargeted treatment strategy.

**Cost results**
The costs ($1,000s) were:
- 9,425,985 with no incremental HAART programme,
- 10,392,885 with the IDU-targeted treatment strategy,
- 10,471,769 with the non-IDU-targeted treatment strategy,
- 10,610,477 with the untargeted treatment strategy, and
- 11,163,471 with the optimistic untargeted treatment strategy.

**Synthesis of costs and benefits**
An incremental cost-effectiveness ratio was calculated in order to combine the costs and benefits of the strategy under evaluation.

Over the no incremental HAART programme, the incremental costs per QALY gained were:
- $1,501 with the IDU-targeted treatment strategy,
- $2,572 with the non-IDU-targeted treatment strategy,
- $1,877 with the untargeted treatment strategy, and
- $1,827 with the optimistic untargeted treatment strategy.

The results of the sensitivity analyses showed that the base-case results were sensitive to HIV transmission parameters such as sexual transmission rates, HAART-related reductions in rates of infection, risky injecting behaviour and risky sexual behaviour.

**Authors' conclusions**
Expanded use of highly active antiretroviral therapy (HAART) was cost-effective. Exclusive treatment of non-injection drug users (non-IDUs) was the least cost-effective option.
CRD COMMENTARY - Selection of comparators
The justification for the choice of the comparator was clear. Non-IDU-targeted treatment was the common practice in the authors’ setting. You should decide whether this is valid in your own setting.

Validity of estimate of measure of effectiveness
It would appear that an extensive review of the literature was conducted to obtain the effectiveness and epidemiological estimates used in the model. However, it was unclear whether this was a systematic review as the methods and conduct of the review were not reported. The designs of the primary studies were also not reported, thus the quality of the data was hard to assess. The uncertainty around estimates used in the decision model was investigated in the sensitivity analyses. The strategy definitions contained significant assumptions about the proportion of the population reached by the interventions.

Validity of estimate of measure of benefit
The measure of benefit was the QALYs gained. These were calculated from the model. Since the source of the utility values was not stated, it is not possible to comment on the validity of this measure. The benefits were discounted, which was appropriate given the time horizon of the study.

Validity of estimate of costs
The perspective adopted in the study was not explicitly reported. The authors included a wide range of health service costs and did not report the exclusion of any costs. The authors stated that the costs came from published sources. The unit costs were not analysed separately from the quantities of resources used, and this may create difficulties for anyone wishing to replicate the analysis in other settings. Statistical analyses of the costs were not carried out, but the costs were varied in the sensitivity analysis. The price year was not reported, which will hamper reflation exercises in other time periods. Appropriate discounting was performed.

Other issues
The authors did not compare their findings with those from other studies. The issue of the generalisability of the study results to other settings was implicitly addressed through the extensive sensitivity analyses. Replicating the study in other settings may be difficult given the limited information in relation to cost data. The authors did not discuss the limitations of their analysis.

Implications of the study
The study supported the treatment strategy where both IDUs and non-IDUs receive HAART.

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