Cost-effectiveness of counseling and testing and partner notification: a decision analysis

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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
Testing for HIV and risk reduction counselling (pre-test and post-test) of people attending Sexually Transmitted Diseases (STD) clinics and adding partner notification to the testing and counselling programme.

Type of intervention
Primary prevention and screening.

Economic study type
Cost-effectiveness analysis.

Study population
The study consisted of patients attending STD clinics.

Setting
Primary care, community clinics for STD in the USA.

Dates to which data relate
Epidemiological and effectiveness data were derived from a non systematic review of the literature and were retrieved from studies published between 1991 and 1998. Resource use data were also taken from studies published between 1991 and 1998. The price year was 1997.

Source of effectiveness data
Effectiveness data were derived form a review of the literature plus authors' assumptions.

Modelling
Two decision trees (Treeage DATA) were used to model the cost-effectiveness of the intervention, to determine how many HIV cases would occur with and without the treatment. The first tree compared counselling and testing to no counselling and testing. The second tree compared partner notification to no partner notification.

Outcomes assessed in the review
The review assessed probabilities associated with HIV prevalence, the uptake of counselling, the effects of counselling on behaviour and the rate of transmission of HIV with and without counselling, referrals to the clinic when the patient notifies partners and when the clinic notifies partners.

Study designs and other criteria for inclusion in the review
Not reported.

Sources searched to identify primary studies
Not reported.

Criteria used to ensure the validity of primary studies
Not reported.

Methods used to judge relevance and validity, and for extracting data
Not reported.

Number of primary studies included
Approximately 16 studies were included in the review.

Methods of combining primary studies
A point estimate was chosen from the range identified in the literature, but the basis for choosing the point estimate was not always reported.

Investigation of differences between primary studies
Not reported.

Results of the review
The following estimates were taken from the literature, (ranges tested in the sensitivity analysis are shown in parentheses):

HIV prevalence at STD clinics, 1.5% (range: 1.0 - 5.0%);

percentage of people who return for post-test counselling, 75% (range: 40 - 90%) for those infected with HIV, and 67% (range: 30 - 80%) for those uninfected;

probability that the current partner of an infected individual is also infected, 20% (range: 18 - 40%);

probability that an infected person will transmit the infection to their partner, 7% (range: 5 - 30%);

the transmission risk would be reduced by 50% (range: 10 - 70%) as a result of post-test counselling;

the risk of HIV infection for an uninfected person attending a clinic in the year following enrolment in a prevention study, 0.35%;

the risk of infection to the uninfected was reduced by counselling by 20% (range: 10 - 50%);

for every infected person identified by the programme, 0.6 partners were found and offered testing when the clinic found the partners;

when the patient found the partner, 0.08 partners per patient were found;

the incidence of HIV was 20% (range: 18 - 46%) among partners;

90% (range: 54% - 100%) of the partners located will take up the offer of counselling and testing;
25% of the partners who turn out to be infected only have one partner;
of the remaining partners (who have more than one partner), 20% of their partners are already infected with HIV;
the risk of transmitting HIV for the infected partners, who do not learn that they have an infected partner, is 7%;
among the infected partners who learn that they have an infected partner, but do not want to participate in the clinic's programme, the risk of transmitting HIV is still reduced by 25% (range 10% - 50%);
if the infected partner does participate in the clinic's programme, their risk of infecting others goes down to 3.5%;
among the uninfected partners who are notified but do not participate in the programme, their risk of becoming infected goes down by 25% (range 10% - 50%) to 2.63%; and
if the uninfected person does participate in the programme their risk of acquiring HIV goes down by a further 25% to 1.7%.
These data formed the input parameters to the decision trees.

**Estimates of effectiveness and key assumptions**

In the modelling exercise the authors assumed that each index patient (IP), (the person who had been tested and found to have HIV) was assumed to have only one partner. The partner of the IP was assumed to have no more than one other partner apart from the IP. Heterosexual transmission and infection rates, rather than the rates applicable to men who have sex with men and injecting drug users, were used in the model. Also the HIV incidence among STD clinic patients, rather than the general population, was used.

**Measure of benefits used in the economic analysis**

The number of HIV cases prevented was used as the measure of benefit. A decision tree was adopted to estimate the probability of HIV infection with and without the programme. Health states were not valued.

**Direct costs**

Costs were taken from the literature and were discounted when necessary, i.e. for the costs of treating someone with HIV. Quantities and costs were not reported separately. The costs were valued at 1997 prices, the years of the original data were 1992 and 1996. The medical care services component of the Consumer Price Index (CPI) was used to reflate the cost data. No difference between marginal cost and average cost was reported. Costs included counselling, testing, finding and notifying partners, and treatment costs of HIV. The perspectives adopted were that of both society and the provider of the services.

**Indirect Costs**

To take account of all costs incurred by society, patient time involved in the counselling and testing for HIV was included as an indirect cost, and was reflated to 1997 prices. No discounting took place because the costs were not incurred over an extended period of time. Quantities and costs were not analysed separately. The data source was published literature, but the details of how the sources were chosen were not given.

**Currency**

US dollars ($).

**Sensitivity analysis**

A series of one-way sensitivity analyses was carried out with respect to the following parameters: risk of HIV transmission, risk of acquiring HIV, effectiveness of counselling on behaviour, treatment cost of HIV. All other
parameters were also subjected to sensitivity analysis but the authors stated that the results were not sensitive to changes in these parameters. The generalisability of the results was not addressed.

**Estimated benefits used in the economic analysis**

The benefit of testing for HIV and risk reduction counselling (pre-test and post-test) of people attending STD clinics was a reduction of 7.77 (per 10,000 people) in the number of HIV cases in comparison with the do nothing option. The benefit of adding partner notification to the testing and counselling was a reduction of 7.94 cases when the patient notifies their partner, and 9.01 when the clinic notifies the partner. The reduction is for the year following the intervention. No side effects were considered.

**Cost results**

The initial cost, for 10,000 people was $248,196 for counselling and testing only, and $283,000 when partner notification was added (when partner notified by clinic). The cost of the programme was assumed to be unchanged if the patient notified their partner.

For 10,000 people tested, the cost of treating people with HIV was $6,984,779 for counselling and testing only, and $6,768,492 when partner notification was added (partner notified by clinic). The cost was $6,960,597 when the patient notified the partner. Had there been no testing and counselling programme the cost of treating people with HIV was taken to have been $8,222,935.

The costs of treating people with HIV were discounted by 3% and all costs were expressed in 1997 prices. The incremental cost of testing for HIV and risk reduction counselling (pre-test and post-test) of people attending STD clinics was -$989,960, - $1,014,142 when partner notification was added to the testing and counselling programme (when the patient informed their partner), and -$1,071,443 when the clinic informed the partner. Thus both testing for HIV and risk reduction counselling (pre-test and post-test) of people attending STD clinics and adding partner notification to the testing and counselling programme would result in a lowering of total health-care expenditure.

**Synthesis of costs and benefits**

Each type of intervention was shown to reduce the number of HIV cases and to reduce the total health expenditure on HIV.

For the clinic providing the intervention to 10,000 people, the cost of a reduction of 8 in the number of HIV cases would be $248,196, for testing for HIV and risk reduction counselling (pre-test and post-test) of people attending STD clinics. Adding partner notification to the testing and counselling programme would reduce the number of HIV cases by 9 and cost $283,000. Total health care costs for society would go down by $989,960 with testing for HIV and risk reduction counselling (pre-test and post-test) of people attending STD clinics and by an extra $181,483 for adding partner notification to the testing and counselling programme. The reduction in expenditure resulting from treating fewer people with HIV would be greater than the cost of providing the intervention.

The results were shown to be sensitive to certain key parameters. If the treatment costs of HIV went down to $40,000, if infection risks go down, (from 3.5/1000 to 1/1000) and if the risk of transmission goes down (from 7/100 to 1/100) then total healthcare costs would not go down under testing for HIV and risk reduction counselling (pre-test and post-test) of people attending STD clinics. If treatment costs went down to $20,000 and infection risk went down to 1.6/100 then adding partner notification to the testing and counselling programme would not result in a reduction in health costs.

The authors point out the sensitivity of the results to assumptions about the effectiveness of counselling on changing risky behaviour, 10-70% was the range of possible values for infected people, and 10-50% for uninfected people. They report that if the 70% value is chosen for the former, 10 fewer people would acquire HIV, if 50% is chosen for the latter, 15 fewer people would become infected with HIV. The authors did not specify for which of the interventions these results were obtained.
Authors' conclusions
Counselling and testing for HIV would reduce total costs for the healthcare system as a whole and reduce HIV cases by 8 (per 10,000 people tested). If the programme is extended to include partners of infected persons, HIV cases would be reduced by 9. The authors regard this evidence as sufficient to justify expenditure on counselling and testing for HIV.

CRD COMMENTARY - Selection of comparators
The aim of the study is very important, to assess expenditure on counselling and testing for HIV. This was assessed with and without partners being included in the programme. The implicit comparator was current practice where there is no programme of testing and counselling. (do nothing).

Validity of estimate of effectiveness:

The estimate of effectiveness was derived by using a decision tree model with parameters being derived from published papers. However no systematic review of the literature was undertaken, data were taken selectively from the available studies, and it was not clear why those studies had been chosen, (selection bias may therefore be present). The actual modelling exercise was clearly reported and extensive sensitivity analyses were undertaken to test the variability of the data used in the model.

Validity of estimate of benefit:

The measure of health benefit chosen was the reduction in number of HIV infections.

Validity of estimate of costs
A good feature of this study was that two perspectives were adopted, that of society and of provider. Costs and quantities were not reported separately, unit costs were taken from published sources, but the exact way in which this was done was not always clear. The authors reported that indirect costs were included, patient-time was included as a cost of counselling, but not as a cost of undergoing HIV treatment. This omission would not affect the authors' conclusions, it would strengthen their view that HIV counselling and testing should be provided. Prices were expressed in 1997 dollars and discounting was undertaken where necessary. A sensitivity analysis of prices was conducted. The cost results may not be generalisable outside the USA.

Other issues
The authors did not compare their results with the findings of other studies and did not address the issue of generalisability to other settings. However their conclusions do reflect the scope of the analysis and they acknowledge several limitations of their study. They draw attention to the fact that a counselling and testing programme will lead to earlier detection of HIV, and thus to an increase in treatment costs. Also, the model assumes that the reduction in HIV cases is permanent whereas some people who avoid HIV as a result of the programme will eventually get it from another source. The authors point out that it would be very useful to know the lifetime probability of acquiring HIV. The latter two omissions would weaken the authors' conclusions, however another omission will strengthen them, that is the assumption of only one partner. The more partners that a person has, the greater the effect of risk reduction counselling. It is not clear whether the results would be generalisable to other settings, the authors recognise that the results obtained from STD clinics may not be generalisable to the general population of the USA.

Implications of the study
The authors recommend that society would be better off with programmes of testing and counselling for HIV. They say that their research would have been more reliable with better information on the effectiveness of counselling. The large range in the estimates of effectiveness of counselling shows how important it is to find out why there is such a big variation and to establish the characteristics of successful counselling. They point out the need for further research on the lifetime probability of HIV infection; with that research their own research would be more useful. Despite the limitations of the study, the overall conclusion seems robust.
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