The cost-effectiveness of expanded HIV counselling and testing in primary care settings: a first look

Phillips K A, Fernyak S

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 expanded counselling and testing (C&T) for human immunodeficiency virus (HIV) in primary care practices. Two options were investigated. First, requesting all patients to complete an HIV risk-screening instrument with C&T offered only to those patients disclosing a high risk (risk-history option). Second, the routine offering of voluntary testing to all patients but no pre-test counselling (routine testing option). The comparator was current practice.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis and cost-utility analysis

Study population
The study population comprised patients aged 15 to 65 years making new patient visits to primary care providers.

Setting
The setting was primary care providers (general, family or internal medicine) in the USA.

Dates to which data relate
The effectiveness data were collected from studies published between 1992 and 1998. The cost data was collected from studies published in 1996 and 1997. The price year was June 1999.

Source of effectiveness data
The effectiveness data were derived from a review and synthesis of completed studies.

Modelling
A decision-tree model was used to estimate the benefits and the costs. The purpose was to examine the incremental costs and benefits of each approach relative to the comparator.

Outcomes assessed in the review
The following were assessed.

The probabilities of the patients being offered and accepting each of the four current practice alternatives for the comparator.
The probability of the patients having high risk factors for developing HIV.

The probability of the patients accepting the testing.

The probability that the patient is HIV-positive (prevalence of HIV).

The probability of a false-positive enzyme immunoassay (EIA) test.

The probability of a false-negative EIA test.

The probability of a false-positive or false-negative Western blot test ('gold' standard).

The probability of HIV-positive patients changing their behaviour following C&T.

The probability of high-risk HIV-negative patients changing their behaviour following C&T.

The probability of HIV-positive patients infecting others over their lifetime.

The probability of HIV-negative patients who does not change their behaviour becoming infected over their lifetime.

The years of life saved per HIV infection averted.

The quality-adjusted life-years (QALYs) saved per HIV infection averted.

**Study designs and other criteria for inclusion in the review**
The data were obtained from a variety of sources including other reviews of the literature. The authors did not state the inclusion or exclusion criteria used when selecting the studies.

**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**
The effectiveness evidence was obtained from 27 published studies and one unpublished study.

**Methods of combining primary studies**
Not reported.

**Investigation of differences between primary studies**
For the probability that patients had high risk factors for HIV, the authors compared data from two studies that asked about behaviour during the past 10 years and during the past year only, respectively. The former study estimated a higher prevalence of risk factors. The authors used the data as the upper and lower values for the sensitivity analysis.

For the probabilities of accepting testing, the authors suggested that the acceptance rates were high when testing was
offered to patients with disclosed risk factors, when encouraged by a physician, or when offered as part of routine care. The acceptance rates were lower in settings where patients were of a low risk and where testing was less convenient. For example, where patients would have to make a separate visit to a laboratory.

Results of the review
The following results are presented as the baseline estimates. The ranges in the brackets are those for the sensitivity analysis.

The probabilities of patients being offered and accepting each of the four current practice alternatives for the comparator were:

for face-to-face counselling, 15% (range: 5 - 25);
for screening for risk factors, 10% (range: 5 - 25);
for routine testing, 2% (range: 1 - 15); and
for requesting testing, 5% (range: 0 - 25).

The probability of patients having high HIV risk factors was 31% (range: 15 - 75).

The probability of patients accepting testing was 50% (range: 25 - 75).

The probability the patient was HIV-positive (prevalence of HIV) was 0.15% (range: 0.10 - 1.00).

The probability of a false-positive EIA test was 0% (range: 0 - 0.2).

The probability of a false-negative EIA test was 0% (range not given).

The probability of a false-positive or false-negative Western blot test was 0%.

The probability of HIV-positive patients changing their behaviour following C&T was 0% (range: 0 - 20).

The probability of high-risk HIV-negative patients changing their behaviour following C&T was 0% (range: 0 - 2).

The probability of HIV-positive patients who do not change their behaviour infecting others over their lifetime, was 50% (range: 0 - 100).

The probability of HIV-negative patients who do not change their behaviour becoming infected over their lifetime was 0.3% (range: 0 - 25).

The authors estimated that 10.25 years of life would be saved per HIV infection averted

The authors estimated that 11.23 QALYs would be saved per HIV infection averted

Measure of benefits used in the economic analysis
The life-years and QALYs were discounted at an annual rate of 3%. In the primary analysis, the outcome measure was the number of HIV infections identified

In the secondary analysis, the outcome measures were the number of infections averted, the life-years gained and the QALYs gained, all as a result of the patients changing their behaviour. The method of valuation was not reported.

Direct costs
The costs were discounted at a rate of 3%. The quantities and the costs were analysed separately. The quantities and the
costs analysed were:

the resource costs of the consumables for C&T (test kits and processing);

the physician's time spent obtaining consent and post-test counselling (if needed);

the physician's time spent obtaining risk histories (in the risk-history option); and

in the secondary analysis, the cost saved if an HIV infection could be averted.

The quantity/cost boundary adopted was that of the health service. The authors stated that the value of patient time, office visit charges and administrative costs were excluded because few patients visit primary care solely for the purpose of HIV testing. The unit costs were derived from actual data. Extrapolation was used to estimate the cost saved if an HIV infection could be averted, but no details were given of how this figure was calculated. The unit costs and resource use were derived from eight studies, published between 1996 and 1997. The price year was June 1999. The costs were inflated to this period using the Medical Care component of the US Consumer Price Index. The study reported marginal costs.

**Indirect Costs**

Although the perspective of the study was stated to be societal, the costs of lost productivity were excluded because it was assumed that they were captured by the use of QALYs. No other indirect costs were considered.

**Currency**

US dollars ($).

**Sensitivity analysis**

A one-way sensitivity analysis was carried out on all the parameters used as model inputs that were considered to be sensitive. A threshold analysis was used to find the percentage of patients who would need to change their behaviour to make C&T cost-effective. Also, to determine the percentage of high-risk HIV-negative individuals who would need to change their behaviour to make the "risk-histories" strategy cost-effective. An analysis of extremes (best- and worst-case scenarios) was conducted for the prevalence of HIV, the percentage of patients with high-risk factors, the percentage of patients accepting testing, and the cost of the test.

**Estimated benefits used in the economic analysis**

The results reported were for a population of 27 million patients.

The number of infections identified was 5,925 with current practice, 17,622 with the risk-histories strategy, and 20,255 with routine testing.

The life-years gained were 74,400 with current practice, 232,000 with the risk-histories strategy, and 267,000 with routine testing.

The QALYs gained were 60,500 with current practice, 188,000 with the risk-histories strategy, and 216,000 with routine testing.

The incremental values were reported.

**Cost results**

The discount rate was 3%.

The intervention and comparator costs for the primary analysis, for a population of 27 million patients, were $76.1
million for current practice, $137.6 million for the risk-histories strategy, and $136.7 million for routine testing.

The intervention and comparator costs for the secondary analysis were $1,459.9 million for current practice, $4,472.1 million for the risk-histories strategy, and $5,087.3 million for routine testing.

The duration of the primary analysis was one year. The duration of the secondary analysis was not reported.

**Synthesis of costs and benefits**

The estimated costs and benefits were combined using incremental cost-effectiveness and cost-utility analyses. For the primary analysis, the strategy of risk histories was dominated by the routine testing strategy at baseline values. The voluntary, routine testing strategy cost $4,200 per infection identified. The authors suggested that routine testing might be excluded as a policy option on the grounds of feasibility or ethical concerns. If so, the risk-histories approach costs $5,300 per infection identified.

The incremental cost per life-year gained (versus current practices) was $19,100 for risk histories and $18,800 for routine testing. The incremental cost per QALY was $23,600 for risk histories and $23,300 for routine testing.

The authors reported the following sensitive parameters.

HIV prevalence: if the prevalence was 0.1%, the incremental cost-effectiveness ratio (ICER) rose to $6,600 per infection identified. At a prevalence of 1%, the ICER fell to $700 per infection identified.

The percentage of patients with risk factors: if fewer than 23% of the patients had risk factors, the risk-histories strategy was preferred.

HIV-negative testing costs: if the costs of C&T for HIV-negative patients fell to $11, the risk-histories strategy was preferred.

The percentage of patients accepting C&T: if more than 90% of the patients accepted testing, risk histories became preferred. The authors suggested that an acceptance rate this high is unlikely.

The results of the multi-way sensitivity analysis were as follows.

Best-case scenario: high HIV prevalence (1%), high percentage risk factors (75%), high acceptance of testing (75%) and the low cost of a negative test ($5), led to a cost of $780 per infection identified.

Worst-case scenario: low HIV prevalence (0.1%), low percentage risk factors (15%), low acceptance of routine testing (25%) and the high cost of a negative test ($10 for routine and $70 for risk history), led to a cost of $11,000 per infection identified. The authors compared this favourably with other studies looking at the cost per infection identified for hospital inpatients and targeting pregnant women.

**Authors' conclusions**

Routine testing was more cost-effective than risk histories for the identification of new human immunodeficiency virus (HIV) infections under the baseline assumptions. This result was sensitive to the assumptions in the baseline case. However, both strategies were preferred to the current practice.

**CRD COMMENTARY - Selection of comparators**

The comparator was chosen to reflect the diversity of current practice in the USA as a whole. This may limit the generalisability of the study since current practice would be expected to differ within and between countries.

**Validity of estimate of measure of effectiveness**

The study relied on a number of sources for the estimates of effectiveness. The authors did not state that a systematic
A review of the literature had been undertaken, although for some parameters of the model they used a published literature review. The authors investigated the differences between the estimates of many important parameters in the model and offered reasonable explanations. This increases the validity of the study. Extensive sensitivity analyses were also performed to address variability in the effectiveness estimates.

**Validity of estimate of measure of benefit**
The primary analysis used the ‘number of infections detected’ as the measure of benefit. This was acceptable given the limited aims of the study, which was intended to be a first look at the cost-effectiveness of screening, with a one-year horizon. The secondary analysis extrapolated further, although the authors did not state over how many years they were looking ahead. The methods to calculate the savings for the treatment costs of infections averted, and the QALYs were not stated. The simple model used was inappropriate to assess the long-term effect of a chronic illness such as HIV or AIDS on the population. The authors acknowledged that a Markov model is required for this purpose. Therefore, insufficient data were provided to assess the authors’ claims that screening improves health-related quality of life in the long term.

**Validity of estimate of costs**
The authors claimed to be working from a societal perspective. They also claimed that by using QALYs they were working from a societal perspective and capturing lost productivity costs. This claim cannot be substantiated without knowing the method used to value health preferences, which was not reported. Therefore, there is insufficient information to assess whether the indirect costs have been dealt with in an appropriate manner.

The authors excluded the value of patient time, office visit charges and administrative costs, claiming that few patients visit primary care providers solely for the purpose of HIV testing. The direct, marginal costs of the physician's time and the costs of test kits and processing were calculated in an appropriate manner, with the unit costs and quantities reported separately. However, it is likely that using such a limited definition of marginal costs underestimated the costs of expanding C&T on a population-wide scale. In particular, there would have to be a considerable administrative effort to run the programme and training of primary care practitioners in counselling techniques. This would be likely to affect the authors’ conclusions relating to the cost-effectiveness.

**Other issues**
The authors identified other studies that showed that expanded C&T was not cost-effective, and offered explanations for the difference. They acknowledged that other studies have included the entire cost of the testing visit, whereas they themselves took a more limited view of the costs. However, their justification for reducing their estimate of the cost of C&T relied on a single unpublished study. The authors may, therefore, have used the data from the available studies selectively. The selection of the comparator may limit generalisability, since the probabilities of patients receiving the comparator treatments will differ both within and between countries. The authors recognised a number of limitations to their study. These included data uncertainty and the acceptability to patients of HIV testing.

**Implications of the study**
The authors do not make any firm recommendations to change clinical practice, recognising that it is unknown whether effective and efficient counselling can be widely implemented in primary care practices. They suggest further research to increase the cost-effectiveness of C&T. For example, more efficient means to obtain risk-histories and conduct counselling, and the use of new technologies such as rapid tests. They also suggest that research for C&T should be conducted in other settings and with different age ranges, in order to increase the generalisability.

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