Cost-effectiveness of prevention referrals for high-risk HIV-negatives in San Francisco

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 technology considered was the implementation of referrals of high-risk seronegatives at human immunodeficiency virus (HIV) test sites in San Francisco to prevention services.

Type of intervention
Primary prevention

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised high-risk seronegatives returning for test results by the SFDPH.

Setting
The setting was primary care. The economic study was carried out in the USA.

Dates to which data relate
For the effectiveness data, the authors included studies published between 1993 and 1999 in their list of references. The cost data were obtained from a study published in 1997 and from programme managers at the SFPDH and at prevention programmes throughout San Francisco.

Source of effectiveness data
The evidence was derived from completed studies.

Modelling
The authors calculated the number of HIV infections averted from the baseline incidence, the reduction in incidence due to prevention, and the number of HIV-negatives in the risk group completing referrals from all city test sites.

Outcomes assessed in the review
The clinical and epidemiological data obtained from the review were:

- the HIV incidence rates,
- the effect of prevention services on the HIV incidence rates,
- referral rates, and
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
Five published studies provided evidence of effectiveness.

Methods of combining primary studies
The authors used data from the included studies selectively.

Investigation of differences between primary studies
Not reported.

Results of the review
The HIV incidence rate was 0.027 (range: 0.012 - 0.06) for young men (under 30 years) who have sex with men (MSMs), 0.014 (range: 0.01 - 0.06) for older MSMs (over 30 years), and 0.012 (range: 0.01 - 0.06) for intravenous drug users (IDUs).

The effect of prevention services on HIV incidence rates was:

- 0.33 (range: 0.15 - 0.5) for educational groups,
- 0.25 (range: 0.10 - 0.50) for multiple-session group therapy and counselling,
- 0.25 (range: 0.10 - 0.50) for multiple-session support group,
- 0.25 (range: 0.10 - 0.50) for sexual behaviour 12-step support group, and
- 0.25 (range: 0.15 - 0.40) for needle exchange.

The referral rate was 0.19 (range: 0.14 - 0.24) for young MSMs, 1.00 (range: 0.75 - 1.00) for older MSMs, and 0.50 (range: 0.23 - 0.77) for IDUs.

The completion rate was 0.19 (range: 0.05 - 0.33) for young MSMs, 0.18 (range: 0.06 - 0.30) for older MSMs, and 0.17 (range: 0.00 - 0.47) for IDUs.

Measure of benefits used in the economic analysis
The measure of benefit considered was the number of HIV infections averted.

**Direct costs**
The cost/quantity boundaries adopted for the costing were those of the health care system and society. The quantities and the costs were not reported separately, and only total figures for main areas of expenditure were reported. The estimate of lifetime costs of HIV infection was taken from a published study. It was not stated whether any discounting was applied in the study. Broad expenditure items included HIV medical costs, cost of referring a patient to prevention, and the patient costs of attending the prevention service. A patient opportunity cost defined as "lost work time" was mentioned in the study. However, it was unclear whether this was valued. The resource consumption and unit costs of referring a patient to prevention were obtained from programme managers at the prevention services used by testing clients in San Francisco, and the patient costs were based on local averages.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
No indirect costs were included in the study.

**Currency**
US dollars ($).

**Sensitivity analysis**
Variability in the data was examined. To obtain "best case" and "worst case" ranges for each parameter, the HIV incidence rates, effect of prevention on HIV incidence rates, referral rates, follow-through rates, marginal cost of the prevention service, and lifetime costs of HIV infection and acquired immune deficiency syndrome (AIDS) were examined.

**Estimated benefits used in the economic analysis**
For the city-wide population of 6,266 high-risk seronegatives receiving test results, the provision of prevention referrals averts 2.0 infections per year.

For the sexually-transmitted disease (STD) clinic population of 289, the programme averted 0.01 infections.

**Cost results**
The total referral list and pamphlet production costs were $9,140.

The total training costs were $1,564 from the SFDPH perspective and $2,813 from a societal perspective.

The lifetime costs of HIV infection and AIDS used for the analysis were $130,000.

An overall figure for the total costs, including all areas of expenditure, was not computed.

**Synthesis of costs and benefits**
The cost-effectiveness ratios were computed from the societal and the SFDPH perspectives.

From the societal perspective, the cost per HIV infection averted was calculated as (all referral and prevention costs) minus (the number of HIV infections averted multiplied by the lifetime medical costs of treating a person with HIV),
divided by the number of HIV infections averted. The same method was considered for computing the cost-effectiveness ratios from the SFDPH perspective, but without considering the lifetime medical costs of treating a person with HIV.

The total cost per infection averted was $20,738 for the SFDPH, and there was an overall programme saving of $43,765 for society.

Cost-effectiveness was estimated to be very sensitive to uncertainty in HIV incidence and the effect of prevention of HIV incidence. The cost per infection averted ranged from $5,833 to $44,505 for the SFDPH, and from a $105,754 net saving to a cost of $7,760 per HIV infection averted for society.

The range in HIV treatment costs yielded wide variation in societal cost-savings (ranging from $108,953 to $810).

**Authors' conclusions**
The provision of human immunodeficiency virus (HIV) prevention referrals to high-risk seronegatives receiving antibody testing imposes significant costs, but has attractive cost-effectiveness when applied to a large high-risk population.

**CRD COMMENTARY - Selection of comparators**
The comparator was not explicitly stated. However, the rationale of the choice of the comparator was clear since a "do nothing" alternative represents standard practice in San Francisco.

**Validity of estimate of measure of effectiveness**
The authors selected studies from the literature according to convenience or their own preference. As such, the effectiveness estimates derived may not be the best available. The authors appear to have used data from the available studies selectively.

**Validity of estimate of measure of benefit**
The number of HIV infections averted would appear to be a valid measure of benefit, although the incidence rates were based on an oral communication and this could hamper the validity of this measure of benefit. Further, the incidence rates were specific to San Francisco.

**Validity of estimate of costs**
The authors stated that the study perspectives were that of the SFDPH and of society. However, productivity losses were not included in the cost analysis. All relevant categories were included for the SFDPH perspective. The resource quantities were not reported separately and no price year was reported. This limits the transferability of the results. Further, the cost estimates are likely to be specific to the SFDPH.

**Other issues**
The authors acknowledged that the post-intervention rates and behaviour changes were estimated by an expert, rather than being measured, thus the extrapolation of San Francisco's municipal STD clinic referral and follow-through rates to patients at all publicly funded San Francisco test sites could be biased. The authors pointed out that some assumptions might have overestimated cost-effectiveness. First, it was assumed that patients who did not receive a referral would not go to a prevention referral by themselves. Second, equivalent marginal costs were assumed when expanding referrals. The authors also acknowledged that other assumptions may have underestimated cost-effectiveness. For example, the 1-year timeframe did not permit dynamic modelling of the HIV epidemic, the secondary HIV transmissions averted were ignored, and economic productivity as a cost-saving of avoiding infection was excluded. The authors did not compare their findings with those of other research. A more detailed exercise would have been more informative to the decision-maker, and a detailed resource use description would have helped.
transferability to other settings. Overall, the results of this study should be considered with some caution.

**Implications of the study**
The study suggested that San Francisco stands to benefit from systematically implementing Centers for Disease Control and Prevention CTRPCRS (Counseling, Testing, Referral and Partner Counseling and Referral Services) guidelines to provide prevention referrals to high-risk seronegatives. Failure to do so would, therefore, be an important missed public health opportunity.

**Source of funding**
Supported in part by grant R96-SFDPH-084, "Effectiveness of Referrals from HIV Test Sites" from the Universitywide AIDS Research Program, University of California, and grant DA09531 from the National Institute on Drug Abuse via the Societal Institute for the Mathematical Sciences.

**Bibliographic details**

**PubMedID**
11571010

**DOI**
10.1080/09540120120063269

**Other publications of related interest**


**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Adult; Cost-Benefit Analysis; HIV Infections /economics /epidemiology /prevention & control; HIV Seronegativity; Humans; Incidence; Male; Needle Sharing; Preventive Health Services /economics; Referral and Consultation /economics; Retrospective Studies; Risk-Taking; San Francisco /epidemiology; Sexual Behavior; Urban Health Services /economics

**AccessionNumber**
22002006171

**Date bibliographic record published**
30/06/2005

**Date abstract record published**
30/06/2005