Condom distribution: a cost-utility 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
The use of a condom social marketing programme in Louisiana to increase condom use by increasing the accessibility of condoms.

Type of intervention
Primary prevention.

Economic study type
Cost-utility analysis.

Study population
The study population consisted of African Americans, men and women, who were visiting businesses in high-risk neighbourhoods and public health clinics.

Setting
The setting was community care. The economic analysis was conducted in Louisiana, USA.

Dates to which data relate
The effectiveness data were collected from a survey conducted between 1994 and 1996 (Cohen et al., see Other Publications of Related Interest) and from studies published between 1994 and 1997. The resource data were gathered from a study published in 1997. Year 1996 prices were used.

Source of effectiveness data
The effectiveness data were gathered from a review of different sources in the literature plus authors’ estimates.

Modelling
The authors used a Bernouilly-process model to translate self-reported sexual behaviours and prevailing epidemiological conditions into an estimate of the number of potential HIV-infections prevented by the programme. The authors divided possible infections into two classes, primary infections and secondary infections. Primary infections occurred when an uninfected person became infected during the study period (3 years). Secondary infections occurred when an infected person transmitted the virus to his or her partner. Equations were used to extrapolate the number of acts of intercourse engaged in by the average clients and the number of acts of intercourse per partner.

Outcomes assessed in the review
The outcomes assessed in the published sources and used as model inputs were:
the prevalence of HIV infection in the study population;
the prevalence of HIV infection in the study partner;
the proportion of condoms used before the intervention;
the proportion of condoms used after the intervention;
condom effectiveness;
the probability of HIV transmission per act of unprotected intercourse;
the probability of HIV transmission per act of condom-protected intercourse; and
the total number of condoms distributed.

Estimates of each parameter, along with the range of plausible alternative estimates, were provided.

**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 four primary studies were included in the literature review.

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

**Investigation of differences between primary studies**
Not reported.

**Results of the review**
The prevalence of HIV infection in the study population was 0.016 (0.008 - 0.032) in men and 0.006 (0.003 - 0.012) in women.

The prevalence of HIV infection in the study partner was 0.006 (0.003 - 0.012) in men and 0.016 (0.008 - 0.032) in women.

The proportion of condoms used before the intervention was 0.40 in men and 0.28 in women.
The proportion of condoms used after the intervention was 0.52 in men and 0.36 in women.

The total number of condoms distributed was 14,116,667 in men and 4,033,333 in women.

Condom effectiveness was 90% (80 - 95).

The probability of HIV transmission per act of unprotected intercourse was 0.001 (0.0003 - 0.0015).

The probability of HIV transmission per act of condom-protected intercourse was 0.0001 (0.0002 - 0.00005).

**Methods used to derive estimates of effectiveness**
The authors estimated or calculated several parameters from equations. Those subsequently used as model inputs were the number of acts of intercourse per client, the number of sexual partners, the number of clients reached by the intervention, and the condom wastage.

**Estimates of effectiveness and key assumptions**
The number of acts of intercourse per client was 306 (102 - 611).

The number of sexual partners was 4 (1 - 10).

Condom wastage was 50% (25 - 75).

The number of clients reached by the intervention was 192,500 (96,250 - 577,500) in men and 82,500 (41,250 - 247,500) in women.

The total number of condoms used was 7,058,333 (3,529,166 - 10,587,500) in men and 2,016,667 (1,008,333 - 3,024,999) in women.

**Measure of benefits used in the economic analysis**
The health benefit measures were the number of primary and secondary HIV infections averted and the number of discounted quality-adjusted life-years (QALYs) gained. The number of primary and secondary HIV infections averted was modelled. The QALYs were derived from a published study (Holtgrave et al., see Other Publications of Related Interest). The benefits were discounted but the discount rate was not reported (it is likely to have been 3%).

**Direct costs**
The perspective adopted was not reported. Only the total cost of the intervention (including staff compensation, office space, staff travel, supplies and condoms) and estimates of the lifetime costs of treating HIV-related illness were included in the cost analysis. The lifetime costs of HIV care were derived from a published study (Holtgrave et al., see Other Publications of Related Interest) and no details on the cost items were given. It was unclear how the total cost of the intervention was estimated (possibly from published literature or by calculation). The resource quantities and the costs were not reported separately. The costs were discounted at an annual rate of 3%.

**Statistical analysis of costs**
No statistical analysis of the costs was performed.

**Indirect Costs**
The indirect costs were not included in the analysis.

**Currency**
US dollars ($).

**Sensitivity analysis**
One-way sensitivity analyses were performed for each parameter using a plausible range.

**Estimated benefits used in the economic analysis**
The number of primary HIV infections averted was 35.6 in men and 27.3 in women. The total number of primary HIV infections averted was 63.14.

The number of secondary HIV infections averted was 96.7 in men and 10.2 in women. The total number of secondary HIV infections averted was 106.81.

The total number of HIV infections averted was 132.5 in men and 37.4 in women, and 169.95 overall.

The number of QALYs saved for each averted case of HIV infection, assuming 26 years of age at infection, has been estimated at 11.23.

The total number of discounted QALYs saved was 1,488 in men and 420 in women, and 1,909 overall.

**Cost results**
Overall, the intervention cost $3,000,000 to deliver over the 3-year period. This cost included $972,000 in staff compensation, $213,000 in office space, staff travel and supplies, and $1,815,000 in condoms.

The total cost of the intervention was $2,333,333 in men and $666,667 in women.

The lifetime costs of HIV care were $195,188.

The total direct medical care costs averted were $33,172,082 ($25,864,936 for men and $7,307,146 for women).

**Synthesis of costs and benefits**
The total cost per discounted QALY saved was -$15,809.

The intervention remained cost-saving for all plausible values of most parameters.

The intervention was cost-saving for increases in condom use above 2.7%.

The prevalence of HIV among men could fall as low as 0.00144 (corresponding prevalence among women, 0.00054) and the programme would still be cost-saving.

The authors showed (in the discussion) that the intervention continued to be cost-saving for lifetime treatment costs exceeding $17,652.

**Authors' conclusions**
The condom social marketing programme prevented human immunodeficiency virus (HIV) infections and was cost-saving for all reasonable parameter assumptions. This type of programme is financially feasible and beneficial to society.

**CRD COMMENTARY - Selection of comparators**
The reason for the choice of the comparator (no prevention) was clear.
Validity of estimate of measure of effectiveness
The authors did not state whether a systematic review of the literature had been undertaken to derive the estimates of effect. They also did not report the method used to judge the validity of the studies included in the review. The methodology for deriving estimates using equations was reported in detail. The estimates were investigated in a sensitivity analysis, using ranges that appear to have been appropriate.

Validity of estimate of measure of benefit
The estimation of benefits was modelled. The model used to derive a measure of health benefit was likely to have been appropriate, even though the authors made several model assumptions. However, the method used to derive the QALY measure may be associated with some limitations. For example, the validity of the study used to derive the QALY measure was not reported. Also, the authors did not report how this study estimated the quality of life in HIV infection, using patients’ preferences (the more appropriate approach) or experts’ opinion. This fact may limit the internal validity and generalisability of the QALY measurements.

Validity of estimate of costs
It is unclear whether all the relevant costs were included in the analysis because the perspective adopted was not stated and no details of the cost items were provided. The source of the intervention costs was not reported. The costs and the quantities were not reported separately. No sensitivity analyses of the quantities and prices were conducted. These facts limit the relevance of the cost analysis. Discounting was reported.

Other issues
The generalisability of the results was not specifically discussed but, in any case, it would be limited by the choice of study population (African Americans). Other populations may have different cultural and behavioural characteristics, which may influence the results in comparison with the present study. The authors made appropriate comparisons of their findings with those from other studies and do not appear to have reported their results selectively. The authors reported some limitations of their study. These included assumptions made about the number of sexual partners and acts of intercourse, and the calculation of the number of infections averted (modelled and not biologically measured). A strong limitation concerns the cost analysis (see Validity of Estimate of Costs).

Implications of the study
In light of their results, the authors believed "condom social marketing should become a routine component of prevention services nationally". The authors added "both focused and broad-based programmes are needed to prevent the further spread of HIV".

Source of funding
None stated.

Bibliographic details

PubMedID
12015012

Other publications of related interest

Holtgrave D, Pinkerton S. Updates of cost of illness and quality of life estimates for use in economic evaluation of HIV

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Condoms /economics; Cost of Illness; Cost-Benefit Analysis; Female; HIV Infections /drug therapy /economics /prevention & control; Humans; Louisiana; Male; Marketing of Health Services; National Health Programs; Quality-Adjusted Life Years; Sexual Behavior

**AccessionNumber**
22002001031

**Date bibliographic record published**
31/08/2004

**Date abstract record published**
31/08/2004