Structural interventions to prevent HIV/sexually transmitted disease: are they cost-effective for women in the Southern United States?

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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 study compared seven structural strategies intended to reduce the occurrence of the human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS). The strategies were improved access to condoms, needle exchange programmes, needle de-regulation, alcohol taxes, a mass media campaign, an opinion leader programme and a street outreach programme. Alcohol taxes are an attempt to reduce risky sexual behaviours through their association with alcohol consumption.

Type of intervention
Prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised hypothetical, at-risk women in the southern states of the USA.

Setting
The study involved the marketing and supply of products, tax and leadership in the southern USA.

Dates to which data relate
Effectiveness data on the different strategies came from studies published from 1993 to 2003. The resource data were either derived from this literature or from assumptions made by the researchers.

Source of effectiveness data
The epidemiological and clinical data in the models included:

- the proportional increases in condom use (by approximately 10%),
- the proportional increases in persons using needle exchange programmes,
- the increase in sterile needles purchased by drug users, and
- a 5% average reduction in gonorrhoea.

Modelling
Several models were used for the different strategies examined. These included Bernoulli, epidemiological and
mathematical models. The cost-effectiveness analysis was estimated using the authors' previous model "Maximising the Benefit" (Cohen et al. 2004, see 'Other Publications of Related Interest’ below for bibliographic details).

Sources searched to identify primary studies
Published evaluations of the seven interventions were used, with at least one or two publications being used for each intervention. The publications were referenced and described in detail for most of the strategies. Assumptions were used to adjust a few parameter estimates.

Methods used to judge relevance and validity, and for extracting data
The methods used to obtain the data estimates appear to have been selective and primarily US-based. There appears to have been no systematic review of the literature. Some assumptions about the duration of the interventions’ effectiveness levels were necessary. However, generally, the effectiveness of the intervention remained while the interventions were in force (i.e. 3 months to 7 years).

Measure of benefits used in the economic analysis
Two measures of benefit were used. These were the number of persons reached by the intervention per year and HIV infections prevented.

Direct costs
The relevant costs to the public health system were the resources involved in implementing the services. These were sourced from the literature but the specific components involved were not reported. Authors' assumptions were used to estimate cost values. The cost of needle exchange was $10 per person for a 3-month period. Arbitrary estimates of $100,000 for needle regulation (lobbying and education-related costs), $100,000 for alcohol taxes (lobbying efforts) and $1,000,000 for an annual mass media campaign were stated. The resource quantities and values were not, in general, reported separately. No price year was given. Adjustments for inflation were not reported.

Statistical analysis of costs
The authors treated the costs deterministically.

Indirect Costs
No productivity costs were included in the analysis.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses on data variability or model structures were not carried out.

Estimated benefits used in the economic analysis
The number of persons reached by the intervention per year ranged from 449 for the opinion leader strategy to 1.5 million for the mass media campaign.

The number of HIV infections prevented was in the range of 21 to 45.3 per year for interventions lasting at least 1 year, or 0.02 to 12.6 for interventions of less than 1 year' duration.

The most effective strategy was increasing the availability of condoms, which prevented 45.3 HIV infections per year.
The least effective strategy was the opinion leader strategy, which prevented 0.02 HIV infections per year.

**Cost results**
The two most costly interventions were increasing condom availability at $1 million per year and street outreach at $550,000 per year. The cheapest interventions were needle de-regulation and alcohol taxes, which cost (approximately) $100,000 per state per year. Needle exchange was $10,000 for 3 months, while the opinion leader programme was $17,100 for 6 months.

**Synthesis of costs and benefits**
The cost and effect data were combined in average cost-effectiveness ratios.

The cost per person reached per year ranged from $0.29 (mass media campaign) to $38 (opinion leader programme). Condom availability and needle exchange were $11 and $10 per person reached per year, respectively.

The cost per HIV infection prevented ranged from $3,600 (alcohol taxes) to $1 million (opinion leader programme). Street outreach, mass media and condom availability programmes produced similar costs per HIV infection prevented ($22,000 to $26,000).

A cost-effectiveness threshold value of $200,000 for any prevention intervention was stated. This was justified as being the amount required per person for the treatment of HIV.

**Authors' conclusions**
The authors concluded that although their cost-effectiveness findings were crude estimates, they remained useful for planning and supported the general belief that campaigns that reach large numbers of people are needed to prevent the spread of human immunodeficiency virus (HIV) infections in low-prevalence populations, such as the one targeted in this study.

**CRD COMMENTARY - Selection of comparators**
Seven strategies were compared in the analysis and all were well-described and justified in the report. These options were similar in that they were structural interventions aimed at the environmental context of the risky behaviour, as opposed to more individually-based strategies. You should decide if the options are relevant and viable in your own setting.

**Validity of estimate of measure of effectiveness**
Data parameters for the effectiveness of the interventions were derived from published literature and authors' opinions. The sources of effectiveness data for two of the interventions were not reported. The numbers of persons reached by the interventions were sourced from published studies that were not based on randomised controlled intervention designs (except for the opinion leader programme). The validity of the effectiveness estimates used is therefore in some doubt. However, without knowing more about these studies it is unclear what their methodological strengths and limitations were.

**Validity of estimate of measure of benefit**
Two measures of benefit were used, namely, the number of persons reached by the intervention per year and the number of HIV infections prevented. While these two benefit outcomes would appear to be linked in theory, no information was provided on the justification for and strength of this link. Computer modelling was used to generate numbers of HIV infections prevented, but relevant formulae or other structural information were not provided. The number of HIV infections prevented was also an intermediate health outcome and does not fully capture the long-term health consequences of these interventions.

**Validity of estimate of costs**
It was unclear from this paper that the costs represented valid estimates, given that arbitrary total programme values
were provided but not information on the cost components. Sensitivity analyses costs were not undertaken on these costs despite the crude estimation of many programme costs.

**Other issues**
The authors approached the analyses in a simple manner without thorough attention to an incremental cost-effectiveness analysis, or sensitivity analyses to test how the results may change with movements in the cost or effectiveness estimates used. No explicit conclusion was reached about which option was the most efficient choice or how the analyses could be improved by future work. The authors did not discuss issues of generalisability to other settings or different population groups.

**Implications of the study**
The authors highlighted the need for caution when applying the cost-effectiveness estimates they have developed. They stated that, at best, the results are very rough approximations.

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None stated.

**Bibliographic details**

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**Other publications of related interest**
Because readers are likely to encounter and assess individual publications, NHS EED abstracts reflect the original publication as it is written, as a stand-alone paper. Where NHS EED abstractors are able to identify positively that a publication is significantly linked to or informed by other publications, these will be referenced in the text of the abstract and their bibliographic details recorded here for information.


**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Condoms; Cost-Benefit Analysis; Female; HIV Infections /epidemiology /etiology /prevention & control; Health Education /economics; Health Promotion /economics; Humans; Mass Media; Needle-Exchange Programs; Prevalence; Public Policy; Risk-Taking; Sexually Transmitted Diseases /epidemiology /etiology /prevention & control; Southeastern United States /epidemiology; Taxes; Women's Health

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