Cost-effectiveness of interventions to prevent HIV and STDs among women: a randomized controlled trial

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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.

CRD summary
This study evaluated the cost-effectiveness of three interventions to prevent sexually transmitted disease in sexually active, adult women, who were using injectable drugs. The authors found that the analysis of trial data and the model produced inconsistent results, and that their study had many limitations. Significant study details were not reported, but the authors’ conclusions were appropriate.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
This study evaluated the cost-effectiveness of three interventions to prevent sexually transmitted disease (STD), in sexually active adult women, who were using injectable drugs.

Interventions
The three interventions were part of the Women Teaching Women programme. They were designed to reduce high-risk sexual behaviour and substance use in drug-using women. They were incremental to each other. The first intervention was the National Institute on Drug Abuse (NIDA)'s cooperative agreement standard intervention. The second intervention added a well-woman examination, and the third intervention also added four educational sessions.

As well as the NIDA content, the standard intervention included a peer facilitator (a woman in drug recovery) providing HIV counselling before and after the test, and blood collection and results. The well-woman examination included routine breast and pelvic examinations (including Papanicolaou smear test), and history taking. The four educational sessions were provided by a peer facilitator and a health professional, and they focused on substance abuse, HIV and AIDS, health and nutrition, and stress and coping. All interventions lasted for four months.

Location/setting
USA/public health.

Methods
Analytical approach:
Two cost-effectiveness analyses were conducted. One was based on the STD outcomes from a large randomised controlled trial. The other used sexual-behaviour outcomes from the trial, with published disease-transmission data, to estimate the STD outcomes using a Bernoulli mathematical model. Trial follow-up was 12 months; the cost-utility analyses covered a lifetime. The authors stated that the perspectives were societal and that of the provider.

Effectiveness data:
Health workers recruited women from target areas in St. Louis, MO, USA. The primary effectiveness measures were the cases of HIV, hepatitis C, chlamydia, gonorrhoea, and syphilis that were prevented. Cases prevented were the difference in prevalence between the 12-month follow-up and the start. Sexual behaviour – protected and unprotected anal and vaginal intercourse, and the number of sexual partners – was used in the alternative model. Disease-transmission rates were from the literature. Condom use was assumed to be 90% effective at preventing STD. Trial outcomes were analysed using intention-to-treat methods.
Monetary benefit and utility valuations:
Quality of life values from the literature were used in the cost-utility analyses. No quality of life data were available for syphilis.

Measure of benefit:
The cost-effectiveness analyses used infections averted as the measure of benefit. The cost-utility analyses used quality-adjusted life-years (QALYs). These were from published studies, for a lifetime, and discounted at 3% annually.

Cost data:
The intervention costs were from a micro-costing study, conducted by the authors. The disease costs were from publications that calculated the average life-long costs of each disease. The costs were in US $.

Analysis of uncertainty:
One-way, bivariate, multivariate, and probabilistic sensitivity analyses were undertaken. The one-way analyses tested the percentage change in the mean, for various parameters, that would cause an intervention to switch from dominated (less effective and more costly) to cost-effective, or vice-versa. The probabilistic results were presented as pair-wise cost-effectiveness acceptability curves (CEACs).

Results
Using the trial data, for all diseases including HIV, well-woman examination was dominated by standard intervention, except for hepatitis C (ICER $109,308 per infection averted) and gonorrhoea ($9,461 per infection averted). The education intervention had an ICER between $8,359 and $94,230 per infection averted.

In the cost-utility analyses, well-woman examination, compared with standard intervention, was dominated for HIV and chlamydia, and had an ICER of $42,482 per QALY gained for hepatitis C, and $1,072,760 per QALY gained for gonorrhoea. The addition of education was dominated for hepatitis C and gonorrhoea, cost saving for HIV, and had an ICER of $3,449,495 per QALY gained for chlamydia.

In the Bernoulli models, for HIV, the ICER for well-woman examination, compared with standard intervention, was $208,316 per infection averted (considering only primary infection; if secondary infection was included the ICER fell to $50,774 per infection averted). The ICER was $172,303 per infection averted for chlamydia, all other ICERs were under $20,000 per infection averted. In the cost-utility analysis, the addition of well-woman examination was cost-saving for HIV and hepatitis C, but over $1 million per QALY gained for chlamydia and gonorrhoea. The addition of education was dominated in all analyses.

The bivariate and multivariate sensitivity analyses, using the Bernoulli models, found that the addition of well-woman examination was cost-effective or cost-saving in all scenarios. Above a prevalence for HIV of 1%, well-woman examination was nearly always cost-saving.

The probabilistic sensitivity analysis, using trial data, found that the addition of education had an ICER of $30,000 or less, in 80% of simulations, for all diseases. The addition of well-woman examination had an ICER of $30,000 or less in 20% of simulations.

Authors’ conclusions
The authors found that the analysis using trial data and the model produced inconsistent results, both agreed that the addition of well-woman examination was cost-effective in preventing hepatitis C and gonorrhoea. They noted that their study had many limitations.

CRD commentary
Interventions:
The interventions were well described and appear to have been reasonable. No comparison with doing nothing was reported. Such an intervention could have been simulated in the Bernoulli modelling by assuming no change from baseline behaviour.

Effectiveness/benefits:
It did not appear that there was any assessment of initial participant differences, including drug use. Few details of the conduct of the trial were reported. The outcomes were appropriately evaluated, using intention-to-treat, but the loss to follow-up was not reported. The sources for the transmission rates were reported, but no details were given on the quality of the data. No methods were described for any of the utility studies. It was unclear how patient quality of life was measured and whose values were obtained. The cost-utility analysis appropriately considered outcomes over a lifetime, but it was not clear if the model considered the ongoing risk of infection after the first year.

Costs:
The costs were appropriately cited, from published literature. The disease costs were presented as a total lifetime cost for each disease, without noting individual components and costing methods. This made it unclear which perspective each analysis took. It seems that the analysis per case averted, using trial data, only included the costs of the intervention; whereas the lifetime costs of the diseases were included in the cost-utility analyses. The reporting limitations make it difficult to assess the validity and generalisability of the costs. The authors did not state that the costs were discounted, and the price year was not stated.

Analysis and results:
The incremental cost-effectiveness analyses could have been explained more clearly. It appears that the cost per case averted excluded lifetime treatment costs, while the cost per QALY gained included them. Useful pair-wise incremental cost-effectiveness analyses were conducted, but a full incremental cost-effectiveness analysis would have been more useful. The addition of education and the well-woman check could have been compared with standard intervention. No methods were presented for the probabilistic sensitivity analyses. The authors acknowledged some other limitations: the model did not account for disease prevalence in the community only in the women, the trial data were from one urban centre, and the model was very sensitive to the input parameters.

Concluding remarks:
Significant study details were not reported, but the authors' conclusions were appropriate.

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