The cost-effectiveness of an outreach clinical model in the management and prevention of gonorrhea and chlamydia among Chinese female sex workers in Hong Kong

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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 two interventions aimed at preventing and treating chlamydia and gonorrhoea in female sex workers (FSWs) in Hong Kong. The first intervention was an outreach service for treatment and prevention of these two diseases, which would be operated at convenient times of the day for FSWs. During the first visit, all FSWs would be screened for these two diseases and receive a sexually transmitted infection counselling session. This intervention was compared with no outreach service, by which FSWs would have to seek usual private medical care.

Type of intervention
Screening and treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised a hypothetical cohort of FSWs in Hong Kong.

Setting
The study setting was the community. The economic study was carried out in Hong Kong.

Dates to which data relate
The effectiveness data were derived from studies published between 1984 and 2004. The price year was not reported.

Source of effectiveness data
The effectiveness data were derived from a review and synthesis of published studies. The review also included one unpublished study.

Modelling
A decision tree was designed to model the outcomes of the two interventions under study. For both interventions, the total number of primary infections, defined as infections acquired over 1 month by FSWs who were previously uninfected or successfully treated, was simulated using a Bernoulli process model. The number of secondary infections, defined as infections transmitted to uninfected clients by infected FSWs who were untreated or failed antimicrobial therapy, was also modelled.

Outcomes assessed in the review
The clinical parameters used in the model were:
the prevalence of gonorrhoea and chlamydia in FSWs;
the rate of chlamydia co-infection among FSWs with gonorrhoea;
medical care self-seeking rate in FSWs;
the odds ratio for outreach service acceptance rate compared with medical care self-seeking rate in FSWs;
the follow-up period for primary infections;
the infection period for secondary infections;
the percentage of contacts protected by condoms;
the odds ratio of percentage of condom use after counselling;
the number of male clients per day;
the effectiveness of antimicrobial therapy in treating gonorrhoea and chlamydia;
the prevalence of gonorrhoea and chlamydia in male clients;
the sensitivity and specificity of conventional culture;
the sensitivity and specificity of DNA/RNA hybridisation for Chlamydia trachomatis DNA;
the probability of female-to-male transmission per unprotected intercourse;
the probability of male-to-female transmission per unprotected intercourse; and
the relative risk of transmission with condoms.

Study designs and other criteria for inclusion in the review
Not applicable.

Sources searched to identify primary studies
Not applicable.

Criteria used to ensure the validity of primary studies
Not applicable.

Methods used to judge relevance and validity, and for extracting data
Not applicable.

Number of primary studies included
Approximately 23 primary studies were included in the review.

Methods of combining primary studies
Not applicable.
**Investigation of differences between primary studies**
It was unclear whether the authors investigated any differences between the primary studies.

**Results of the review**
The clinical data were as follows.

In FSWs, the prevalence of gonorrhoea was 20% (range: 5 to 45) and the prevalence of chlamydia was 32% (range: 8 to 38).

The rate of chlamydia co-infection among FSWs with gonorrhoea was 30% (range: 0 to 100).

The medical care self-seeking rate in FSWs was 50% (range: 0 to 100).

The odds ratio for outreach service acceptance rate compared with medical care self-seeking rate in FSWs was 1.43 (range: 1 to 2).

The follow-up period for primary infections was 30 days.

The infectivity period for secondary infections was 60 days (range: 30 to 90).

The proportion of contacts protected by condoms was 70% (range: 0 to 100).

The odds ratio of percentage of condom use after counselling was 1.3 (range: 1 to 1.5).

The number of male clients per day was 2 (range: 0.5 to 15).

The effectiveness of antimicrobial therapy was 99% (range: 72 to 100) in the treatment of gonorrhoea and 95% (range: 63 to 99) in the treatment of chlamydia.

In male clients, the prevalence of gonorrhoea was 2.4% (range: 1.9 to 2.9) and that of chlamydia was 1.4% (range: 1.1 to 1.7).

The sensitivity of conventional culture was 90% (range: 60 to 97) and the specificity was 100%.

The sensitivity of DNA/RNA hybridisation for Chlamydia trachomatis DNA was 97% (range: 78 to 100) and the specificity was 99% (range: 80 to 100).

The probability of female-to-male transmission per unprotected intercourse was 0.25 (range: 0.2 to 0.3) for gonorrhoea and 0.68 (range: 0.54 to 0.82) for chlamydia.

The probability of male-to-female transmission per unprotected intercourse was 0.6 (range: 0.5 to 0.7) for gonorrhoea and 0.70 (range: 0.56 to 0.84) for chlamydia.

The relative risk of transmission with condoms was 0.42 (range: 0.18 to 0.99) for gonorrhoea and chlamydia.

**Measure of benefits used in the economic analysis**
The measure of benefits used was the number of infected FSWs and male clients with gonorrhoea and chlamydia.

**Direct costs**
The direct costs of the health care provider (i.e. the public health organisation) were included in the analysis. These included the cost per specialist outpatient clinic visit (both private and public), the cost of the counselling session, the cost of conventional culture, the cost of DNA/RNA hybridisation, and the cost of antimicrobial treatment for gonorrhoea and chlamydia. Charges for these resource categories were derived from the Hong Kong Gazette. The costs
were not discounted. However, as the authors did not report the time horizon of the model, it was unclear if discounting was necessary. The study reported the incremental costs and total costs. The price year was not reported.

**Statistical analysis of costs**
The costs were treated as point estimates (i.e. the data were deterministic).

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

**Currency**
US dollars ($). The exchange rate was 1 US $ = 7.8 Hong Kong dollars.

**Sensitivity analysis**
The authors conducted a series of one-way sensitivity analyses to examine the robustness of the model. Where possible, the upper and lower limits of the variable provided the ranges for the sensitivity analysis. Otherwise, a range of +/- 20% of the base-case value was used. Selected two-way sensitivity analyses were further conducted on those variables with threshold values in the one-way sensitivity analysis. To evaluate the impact of uncertainty in all of the variables simultaneously, a probabilistic sensitivity analysis was performed using Monte-Carlo simulation. Each of the model inputs was randomly drawn from a triangular probability distribution 10,000 times.

**Estimated benefits used in the economic analysis**
In the outreach group, 0.427 FSWs were infected with gonorrhoea and 0.388 with chlamydia. In the control group, the numbers of FSWs infected were 0.513 (gonorrhoea) and 0.486 (chlamydia), respectively.

In the outreach group, 5.42 male clients were infected with gonorrhoea and 14.3 with chlamydia. In the control group, the numbers of male clients infected were 6.80 (gonorrhoea) and 18.6 (chlamydia), respectively.

**Cost results**
The costs incurred by the outreach group were $2,141, compared with $3,086 incurred by the control group. Therefore, the outreach clinic generated savings of $945.

**Synthesis of costs and benefits**
There was no need to combine the costs and benefits as the outreach clinic was both more effective and less costly than the control intervention.

The results of the one-way sensitivity analysis showed that the results of the model were sensitive to variations in the number of clients per day and changes in percentage condom use post-counselling. The probabilistic sensitivity analysis showed that the outreach group was less costly than the control group 93% of the time. The number of FSWs with gonorrhoea and new cases in clients was lower in the outreach group 95% and 89% of the time, respectively. Similarly, the number of FSWs with chlamydia and new cases in clients was lower in the outreach group 95% and 91% of the time.

**Authors' conclusions**
An outreach clinic was potentially less costly and more effective in preventing the transmission of gonorrhoea and chlamydia between female sex workers (FSWs) and their clients in Hong Kong.
CRD COMMENTARY - Selection of comparators
A justification was given for using no outreach service clinic as the comparator. It represented current practice in Hong Kong. You should decide if this is a widely used intervention in your own setting.

Validity of estimate of measure of effectiveness
The authors did not undertake a systematic review of the literature to identify all relevant research and minimise biases. However, they appear to have performed a broad review of the literature with over 20 studies being included. Further, since nearly all of the studies were published after 2000, it is likely that their results will still be relevant and up-to-date. The authors did not report how data from relevant studies were combined, nor if there were any differences between these studies.

Validity of estimate of measure of benefit
The estimation of benefits was modelled appropriately using a decision tree model. However, the authors failed to report the time horizon over which health benefits were generated.

Validity of estimate of costs
All the categories of cost relevant to the perspective adopted (i.e. public health organisation) were included in the analysis. All major relevant costs also appear to have been included. The costs and the quantities were not reported separately, which will limit the generalisability of the authors’ conclusions. Charges were used to proxy prices, which might not represent the actual cost of providing a service. Appropriate and exhaustive sensitivity analyses of the costs were undertaken. The costs were not discounted but, since the authors did not report the time horizon of the model, it was unclear if discounting was necessary. The authors appropriately reported the exchange rate used to convert from local currency to US dollars. However, they failed to report the price year, which will hamper any possible inflation exercises.

Other issues
The authors appropriately compared their results with those from other studies which had found that counselling sessions and condom promotion in Hong Kong and Kenya generated savings and reduced the spread of the human immunodeficiency virus amongst FSWs. The issue of generalisability to other settings was partly addressed in the sensitivity analysis. The authors do not appear to have presented their results selectively and their conclusions reflected the scope of the analysis. The authors reported a number of further limitations to their study. For instance, the clinical probabilities were derived generally from international studies, and the clinical outcomes were limited to only two sexually transmitted infections.

Implications of the study
The authors would appear to recommend the establishment of outreach clinics in Hong Kong to prevent and treat sexually transmitted diseases.

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Bibliographic details

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Other publications of related interest


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