Cost-effectiveness of five strategies for gonorrhea and chlamydia control among female and male emergency department patients
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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
Five screening strategies for gonorrhoea and chlamydia were examined.

Strategy 1 was standard emergency department practice (EDP). This involved detection and treatment by emergency department staff. It relied on symptomatic presentation and history.

Strategy 2 was screen all 18- to 31-years-olds and no EDP. This relied solely on urine ligase chain reaction (LCR) to detect infection.

Strategy 3 was screen all 18- to 31-year-olds, by risk factor, plus EDP. Patients who reported any risk factors were screened using LCR to detect infection. Standard EDP was also used.

Strategy 4 was screen all 18- to 31-year-olds and EDP. This involved detection by screening, in addition to EDP.

Strategy 5 was treat all 18- to 31-year-olds, and no EDP. This involved treating all patients without screening them.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised men and women aged between 18 and 44 years old, who presented to the Johns Hopkins Hospital adult emergency department between June and November 1998 for medical treatment of any kind. Patients were excluded from the study if they were psychiatric or critically ill patients.

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

Dates to which data relate
The effectiveness data were collected from June to November 1998. The cost data were obtained from the literature and related to 1981 to 1999, but were translated into 1999 dollars.

Source of effectiveness data
The effectiveness data were derived from a review or synthesis of completed studies and a single study.
Link between effectiveness and cost data
The costs were obtained from the literature.

Study sample
Details of the study methods were presented elsewhere (Mehta et al., see Other Publications of Related Interest). It is therefore impossible to say whether the sample size was determined in the planning stages of the study. Details of how the sample was selected were not provided in this paper. It was not reported whether any patients refused to participate or the number of exclusions.

Study design
Details of the study design were presented elsewhere (Mehta et al., see Other Publications of Related Interest).

Analysis of effectiveness
The effectiveness data recorded in this study were the prevalence of gonorrhoea and chlamydia in men and women.

Effectiveness results
The prevalence of gonorrhoea and chlamydia was 0.135 (range: 0.094 - 0.175) in women and 0.138 (range: 0.084 - 0.193) in men.

Clinical conclusions
The prevalence of gonorrhoea and chlamydia were similar in both men and women.

Modelling
A decision tree model was used to estimate the costs and the benefits. The time horizon of the model was 10 years.

Outcomes assessed in the review
The outcomes assessed were the probabilities of:

developing pelvic inflammatory disease (PID),
asymptomatic PID,
inpatient PID,
surgery,
chronic pelvic pain,
ectopic pregnancy,
tubal infertility,
tubal infertility evaluation,
pregnancy,
neonatal pneumonia,
neonatal conjunctivitis,
female-to-male transmission, 

male-to-female transmission, 

urethritis, 

epididymitis, 

inpatient epididymitis, 

side effects of antibiotic treatment, and 

efficient antibiotic treatment. 

The review also assessed the costs of treatment and complications.

**Study designs and other criteria for inclusion in the review**

Not stated.

**Sources searched to identify primary studies**

Not stated.

**Criteria used to ensure the validity of primary studies**

Not stated.

**Methods used to judge relevance and validity, and for extracting data**

Not stated.

**Number of primary studies included**

Twelve studies were included in the review.

**Methods of combining primary studies**

The methods used to combine the data were not reported, but averages and maximum and minimum values appear to have been used.

**Investigation of differences between primary studies**

The authors do not appear to have investigated any differences between the primary studies, nor did they provide an explanation for any such differences.

**Results of the review**

The probabilities were as follows:

for developing PID, 0.30 (range: 0.10 - 0.40);

for asymptomatic PID, 0.60 (range: 0.50 - 0.75);

for inpatient PID, 0.15 (range: 0.13 - 0.20);
for surgery, 0.33 (range: 0.23 - 0.40);
for chronic pelvic pain, 0.18 (range: 0.15 - 0.20);
for an ectopic pregnancy, 0.078 (range: 0.05 - 0.10);
for tubal infertility, 0.17 (range: 0.10 - 0.20);
for tubal infertility evaluation, 0.25 (range: 0.25 - 0.45);
for pregnancy, 0.03 (range: 0.03 - 0.10);
for neonatal pneumonia, 0.10 (range: 0.03 - 0.16);
for neonatal conjunctivitis, 0.13 (range: 0.13 - 0.25);
for female-to-male transmission, 0.50 (range: 0.33 - 0.75);
for male-to-female transmission, 0.56 (range: 0.56 - 0.65);
for urethritis, 0.50 (range: 0.35 - 0.65);
for epididymitis, 0.02 (range: 0.01 - 0.05);
for inpatient epididymitis, 0.09 (range: 0.05 - 0.15);
for side effects of antibiotic treatment, 0.1 (range: 0.05 - 0.16); and
for efficient antibiotic treatment, 0.95 (range: 0.95 - 0.99).

**Measure of benefits used in the economic analysis**
The measure of health benefit used was the cases of gonorrhoea or chlamydia not treated.

**Direct costs**
The costs of the health care provider were included in the analysis. These were the final weighted sequelae costs for men and women, and the total costs of each screening strategy. The price estimates were obtained from a literature search. The resource quantities and the costs were not reported separately. A discount rate of 3% per annum was applied to the costs. The price year used was 1999. The incremental costs were reported.

**Statistical analysis of costs**
A logistic regression was carried out, details of which were given elsewhere (Mehta et al., see Other Publications of Related Interest).

**Indirect Costs**
No indirect costs were reported.

**Currency**
US dollars ($).

**Sensitivity analysis**
Univariate and multivariate sensitivity analyses were carried out to investigate variability in the parameter data used.

**Estimated benefits used in the economic analysis**
Among women, the number of cases of gonorrhoea or chlamydia not treated was 1,073 with strategy 1, 713 with strategy 2, 706 with strategy 3, 574 with strategy 4, and 68 with strategy 5. The corresponding numbers of cases among men were 1,020 (strategy 1), 1,040 (strategy 2), 890 (strategy 3), 810 (strategy 4), and 70 (strategy 5), respectively.

**Cost results**
The costs obtained from the literature review were for:

- antibiotics, $27 (range: 4.91 - 62);
- side effects of antibiotics, $27.69 (range: 11.82 - 43.55);
- an uncomplicated cure, $176 (range: 137 - 209);
- outpatient PID treatment, $269 (range: 156 - 329);
- inpatient PID, $5,930 (range: 4,722 - 7,138);
- chronic pelvic pain, $5,400 (range: 4,463 - 6,260);
- surgery, $2,308 (range: 2,261 - 2,629);
- ectopic pregnancy, $6,369 (range: 4,175 - 8,912);
- tubal infertility, $1,371 (range: 1,098 - 1,647);
- tubal infertility evaluation, $4,449 (range: 3,039 - 5,979);
- urethritis, $42 (range: 15 - 69);
- outpatient epididymitis, $209 (range: 139 - 253);
- inpatient epididymitis, $3,294 (range: 2,745 - 4,393);
- infant pneumonia, $2,825 (range not given);
- infant conjunctivitis, $113.23 (range: 101.78 - 113.23); and
- urine LCR, either $9.96 per unit or $48.50 per unit.

For women, the cost associated with treating the male partners of infected females was $12.93 (range: 2 - 54.94). The cost associated with neonatal outcomes was $8.92 (range: 2.62 - 48.03). The cost associated with untreated infections in women was $870.69 (range: 308.86 - 2,107.07). Thus, the total cost was $892.54 (range: 313.48 - 2,210.04).

For men, the cost associated with treating the female partners of infected males was $487.59 (range: 197.78 - 1,313.70). The cost associated with neonatal outcomes was $4.99 (range: 1.47 - 31.22). The cost associated with untreated infections in men was $25.87 (range: 15.50 - 73.26). Thus, the total cost was $518.45 (range: 214.75 - 1,418.18).

For women, the total costs were $961,000 for strategy 1, $1,042,245 for strategy 2, $966,245 for strategy 3, $913,245 for strategy 4, and $522,245 for strategy 5.

For men, the total costs were $532,000 for strategy 1, $923,245 for strategy 2, $752,245 for strategy 3, $798,245 for
strategy 4, and $498,245 for strategy 5.

**Synthesis of costs and benefits**
For women, comparing strategy 2 with strategy 1 (the standard) gave an incremental cost-effectiveness ratio (ICER) of $255.68. The ICER was $14.29 for strategy 3 versus the standard, -$95.70 for strategy 4 versus the standard, and -$436.57 for strategy 5 versus the standard.

For men, the ICER was $1,694.19 for strategy 3 versus the standard, $1,267.83 for strategy 4 versus the standard, and -$35.53 for strategy 5 versus the standard.

The sensitivity analysis indicated that the results were susceptible to variations in several parameters, such as the cost of LCR.

**Authors’ conclusions**
The cost-effectiveness of screening was maximised in strategy 4 for women, when screening was carried out along with standard emergency department practice (EDP). Screening all women aged 18 to 31 years was more cost-effective than selective screening. This continued to be the case even when the prevalence of gonorrhoea and chlamydia ranged from 7 to 17.5%. Mass treatment cost less than standard practice for both men and women.

**CRD COMMENTARY - Selection of comparators**
The comparator was justified on the grounds that it represented standard practice. You should decide if this is a widely used health technology in your own setting.

**Validity of estimate of measure of effectiveness**
The details of the analysis of the prevalence of gonorrhoea and chlamydia were not reported in this study. The study sample was representative of the study population. The authors did not state whether a systematic review of the literature was undertaken. They used data from the available studies selectively and did not consider the impact of differences between the primary studies when estimating the effectiveness.

**Validity of estimate of measure of benefit**
The estimation of benefits was modelled. The instrument (decision tree) used to derive the measure of health benefit was appropriate. The measure of health benefit used was the untreated cases of gonorrhoea or chlamydia. However, for meaningful comparisons in other disease areas, the use of quality-adjusted life-years would have been preferable.

**Validity of estimate of costs**
All the categories of cost relevant to the perspective adopted were included in the analysis. The costs and the quantities were not reported separately. A sensitivity analysis of the quantities was not conducted, whereas a sensitivity analysis of the prices was. The ranges used, which were derived from the literature, appear to have been appropriate.

**Other issues**
The authors did not make appropriate comparisons of their findings with those from other studies. However, the issue of the generalisability to other settings was addressed. The authors noted that the emergency department considered in this study was in an urban, inner city area, and that the results may only apply to similar settings. The authors do not appear to have presented their results selectively. The authors’ conclusions were based on the study sample (men and women aged 18 to 44), therefore the conclusions were applied to men and women aged 18 to 44 years.

The authors reported a number of further limitations to their study. For example, the costs of increased risk of miscarriage, low birth weight infants, and greater HIV transmission rates associated with gonorrhoea and chlamydia...
infections were not included. These costs would have made the enhanced screening option even more cost-effective than estimated. The indirect costs of lost productivity and loss of leisure time were also not included, resulting in the underestimation of the total benefit of screening. Spontaneous cure and decreased compliance with multiple dose regimens were not modelled, and these would have decreased the cost-effectiveness of screening. Finally, it was assumed that inpatient antibiotic or surgical therapy would be 100% curative, even though inpatients are more likely to have serious infections.

Implications of the study
Non-invasive screening strategies for gonorrhoea and chlamydia should be considered for introduction in emergency departments.

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Other publications of related interest

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