An evaluation of economics and acceptability of screening for Chlamydia trachomatis infection, in women attending antenatal, abortion, colposcopy and family planning clinics in Scotland, UK

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
Alternative strategies of screening for Chlamydia trachomatis (C. trachomatis) infection were examined. The alternatives were:

- universal screening,
- selective screening by age (under 20 years, 20 - 24 years, 25 - 29 years and 30 years or older), and
- selective screening by clinical setting (family planning clinic, antenatal clinic, colposcopy clinic and abortion clinic).

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised a hypothetical cohort of women of different ages and presenting at different clinics, depending on the strategy considered.

Setting
The settings of the study depended on the screening strategy. They included primary care, family planning clinics, antenatal clinics, colposcopy clinics and abortion clinics. The economic study was carried out in Scotland, UK.

Dates to which data relate
Some effectiveness data were gathered from February 2001 to July 2002. Other effectiveness data were obtained from studies published between 1980 and 2004. No dates for the resource use and cost data were reported. The price year was 2001.

Source of effectiveness data
The effectiveness evidence was derived from a single study and a synthesis of completed studies.

Link between effectiveness and cost data
The costing was not carried out on the same sample of patients as that used in the clinical study.
Study sample
Data from a cohort of women undergoing screening were used to derive some clinical inputs used in the decision model. A total of 3,132 women were initially contacted and only 49 (1.6%) declined to participate. A further 4 women were ineligible, 255 (8.1%) were excluded for a variety of reasons, and 7 (0.2%) had unusable results. Thus, the final study sample comprised 2,817 women (90% of those contacted). The patients’ demographics were not reported. A single group of women was considered. The acceptability or appropriateness of testing was tested in a sub-group of 484 women.

Study design
This was a case series study that was carried out at several centres in Scotland (the Aberdeen Royal Infirmary and the Glasgow Royal Infirmary, Glasgow Royal Maternity and Princess Royal Maternity Hospitals). Women attending antenatal clinics in Glasgow and Aberdeen and women attending abortion clinics in Glasgow provided a first-void urine sample. Women attending colposcopy clinics in Glasgow and Aberdeen and women attending the abortion clinic in Aberdeen allowed an endocervical swab to be taken. Details on the follow-up were not reported.

Analysis of effectiveness
The outcomes derived from the clinical study were the prevalence of infection and the acceptability or appropriateness of testing for women. A multiple regression analysis was carried out to examine the impact of baseline factors (e.g. age, clinic type, geographical region of origin, Carstairs score, and other potential risk factors) on the prevalence rates.

Effectiveness results
The prevalence rate in women younger than 20 years was 12.1% (95% confidence interval, CI: 8.6 - 16.7) in antenatal clinics and 12.6% (95% CI: 8.5 - 18.3) in abortion clinics.

The prevalence rate in women aged between 20 and 24 years was 4.4% (95% CI: 2.8 - 6.9) in antenatal clinics, 8.9% (95% CI: 5.2 - 14.5) in colposcopy clinics, and 11.4% (95% CI: 7.7 - 16.5) in abortion clinics.

The prevalence rate in women aged between 25 and 29 years was 1.4% (95% CI: 0.6 - 3.1) in antenatal clinics, 3.9% (95% CI: 1.7 - 8.6) in colposcopy clinics, and 2.9% (95% CI: 1.1 - 6.9) in abortion clinics.

The prevalence rate in women of 30 years and older was 0.7% (95% CI: 0.1 - 2.1) in antenatal clinics, 4.4% (95% CI: 2.3 - 8.4) in colposcopy clinics, and 2.9% (95% CI: 0.6 - 5.1) in abortion clinics.

The trend towards decreasing prevalence rates with increasing age was significant in both antenatal and abortion clinics, but not in colposcopy clinics.

The multiple regression analysis showed that age, clinic attended, and region of origin were significantly correlated with prevalence.

From the analysis of acceptability or appropriateness of testing:

84% of women though that the clinic in which they were tested was the appropriate one;
78% of women though that the timing of the test was appropriate;
women from the antenatal clinic were significantly least likely to think that their clinic was the suitable place;
89% of women though that C. trachomatis screening could take place at the same time as a cervical smear test;
93% of women thought that men should be tested routinely;
77% thought that they would want their partner to be tested;
46% thought that their partner would attend;

the majority of women (93%) said that they had heard of C. trachomatis, successfully identified the definition of C. trachomatis from a list (99%) and identified that it could be caught through sexual intercourse (97%);

women who "didn't know" if they had ever been tested were significantly less likely to know how C. trachomatis could be caught, (p<0.001);

fewer women knew that C. trachomatis could be caught more than once (63%), with women who had been screened before more likely to respond correctly, (p<0.01);

the majority correctly identified that neither women nor men would always know if they had C. trachomatis (86% of women and 73% of men), and those who had been tested before were more likely to be correct.

Clinical conclusions
The clinical data assessed in the single study were used as inputs in the decision model. The single study showed that women agreed, in general, with a policy of regular screening for C. trachomatis. In addition, screening in the settings employed in the study was acceptable.

Modelling
A decision tree model was constructed to analyse the economic and clinical consequences of alternative screening strategies in a hypothetical population of 1,000 of each of antenatal, abortion and family planning clinic attendees (250 patients in each age group in each clinic) and 750 colposcopy clinic attendees (250 women in each age group). Women younger than 20 years old were excluded from the latter since, as routine cervical screening does not start until the age of 20 years, women under 20 do not commonly attend. The structure of the tree was reported. The model considered major sequelae of C. trachomatis infection, such as pelvic inflammatory disease, chronic pelvic pain, ectopic pregnancy, infertility, male urethritis, epididymitis, infantile conjunctivitis and infantile pneumonia. The time horizon of the model was not explicitly reported.

Outcomes assessed in the review
The clinical data derived from the literature were:

the prevalence of C. trachomatis infection without screening;

the rates of female, neonatal and male sequelae associated with C. trachomatis infection;

the sensitivity and specificity of the LCR test; and

the pregnancy rate.

Study designs and other criteria for inclusion in the review
It was not stated whether a systematic review of the literature was undertaken to identify the primary studies. The design and other characteristics of the primary studies were not described.

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
Seven primary studies provided the model inputs.

Methods of combining primary studies
Each study provided a single estimate, thus the primary estimates were not combined.

Investigation of differences between primary studies
Not stated.

Results of the review
The prevalence without screening was 6.2%.

The rates of female sequelae associated with C. trachomatis infection were 30% for pelvic inflammatory disease (40% symptomatic and 60% asymptomatic), 18% for chronic pelvic pain, 8% for ectopic pregnancy and 12% for infertility.

The rates of neonatal sequelae were 30% for conjunctivitis and 15% for pneumonia.

The rates of male sequelae were 2% for epididymitis and 40% for urethritis.

Overall, the cumulative risk of sequelae was 128%.

The sensitivity of the test was 100% and the specificity was 99%.

The pregnancy rate was 5%.

Measure of benefits used in the economic analysis
The summary benefit measure was the number of sequelae averted. This was estimated using the decision model. The benefits were discounted at an annual rate of 3%.

Direct costs
The time horizon of the cost analysis was unclear, but the authors stated that future costs were discounted at an annual rate of 5%. The unit costs were not presented separately from the quantities of resources used, and the unit costs were presented only for some items. The economic evaluation considered the costs of screening and management of sequelae. The screening costs covered patient recruitment, test samples preparation, purchase of the diagnostic tests, follow-up of test-positive patients and drug treatments for those infected. The costs for the management of sequelae included all clinical investigations, hospitalisations, general practitioner consultations and drug treatments. The cost/resource boundary of the NHS was adopted. Both resource use and costs were estimated on the basis of published studies and experts' opinions. The price year was 2001.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were not included in the economic evaluation.
Currency
UK pounds sterling (£).

Sensitivity analysis
Univariate sensitivity analyses were carried out to examine the robustness of the estimated cost-effectiveness ratios to variations in the model inputs, such as the rate of screening uptake (-50%), probabilities of major sequelae (+/- 20%) and costs (+/- 50%). The authors set the alternative values.

Estimated benefits used in the economic analysis
In a hypothetical cohort of 3,750 women, the number of sequelae averted was:
- 64 with universal screening,
- 30 with selective screening of women under 20 years,
- 54 with selective screening of women under 25 years,
- 59 with selective screening of women under 30 years,
- 16 with selective screening at a family planning clinic,
- 9 with selective screening at an antenatal clinic,
- 25 with selective screening at a colposcopy clinic, and
- 13 with selective screening at an abortion clinic.

Cost results
In a hypothetical cohort of 3,750 women, the estimated costs of screening were:
- 49,367 with universal screening,
- 15,122 with selective screening of women under 20 years,
- 25,988 with selective screening of women under 25 years,
- 37,529 with selective screening of women under 30 years,
- 18,919 with selective screening at a family planning clinic,
- 19,107 with selective screening at an antenatal clinic,
- 16,105 with selective screening at a colposcopy clinic, and
- 18,655 with selective screening at an abortion clinic.

Synthesis of costs and benefits
An incremental cost-effectiveness ratio (i.e. the cost per sequelae averted) was calculated to combine the costs and benefits of the screening strategies in comparison with no screening.

The incremental cost-effectiveness ratio was:
- 651 with universal screening,
258 with selective screening of women under 20 years,
344 with selective screening of women under 25 years,
513 with selective screening of women under 30 years,
694 with selective screening at a family planning clinic,
1,196 with selective screening at an antenatal clinic,
621 with selective screening at a colposcopy clinic, and
433 with selective screening at an abortion clinic.

The sensitivity analysis showed that the estimated ICERs were robust to variations in the key model inputs.

**Authors’ conclusions**
Selective age-based screening for Chlamydia trachomatis (C. trachomatis) was more cost-effective than universal screening (the younger the age group screened, the more cost-effective the screening strategy). Selective screening by clinical setting was also less cost-effective than universal screening, with the exception of colposcopy and abortion clinics. The analysis revealed a high level of acceptability of the test in all settings.

**CRD COMMENTARY - Selection of comparators**
The selection of the comparators appears to have been appropriate since the analysis covered all possible screening strategies (universal versus selective screening by age and setting). A strategy of no screening was also considered as the basic comparator. You should decide whether they are valid comparators in your own setting.

**Validity of estimate of measure of effectiveness**
The clinical evidence came both from a cohort of women recruited at two hospitals in Scotland and from published data. With respect to the former (Scottish hospitals), a single group of women was examined without an explicit control group. Details on the patients’ demographics and follow-up were not reported. In terms of the published evidence, the method used to identify the primary studies was not stated and it was unclear whether a systematic review of the literature had been undertaken. No information on the primary studies was provided. Thus, it was not possible to examine the validity of the primary sources. Most of the key clinical inputs were varied in the sensitivity analysis.

**Validity of estimate of measure of benefit**
The summary benefit measure was specific to the disease considered in the study. It is not comparable with the benefits of other health care interventions.

**Validity of estimate of costs**
The authors stated explicitly which perspective was adopted in the study. As such, it appears that all the relevant categories of costs have been included. However, the inclusion of patient costs (travel and time) would have been interesting. The unit costs were provided only for some items and most of the costs were presented as macro-categories. A detailed breakdown of the costs was not provided. The source of the data was unclear. The costs were treated deterministically in the base-case, but were extensively varied in the sensitivity analysis. The price year was reported, which makes reflation exercises easy.

**Other issues**
The authors did not make extensive comparisons of their findings with those from other studies. However, they stated that their findings were in contrast with current literature in that screening was not found to be cost-saving. The issue of
the generalisability of the study results to other settings was implicitly addressed in the sensitivity analysis, where wide variations in the model inputs were investigated. The study referred to women at risk for C. trachomatis and this was reflected in the authors’ conclusions.

**Implications of the study**
The study results supported currently recommended strategies of screening for C. trachomatis in women under 25 years of age in abortion clinics. Further, hospital-based screening strategies should be further extended to include younger women attending antenatal clinics and all women of reproductive age attending colposcopy clinics.

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