Cost effectiveness of home based population screening for Chlamydia trachomatis in the UK: economic evaluation of chlamydia screening studies (ClaSS) project


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
A proactive, register-based, screening programme for Chlamydia trachomatis was compared with a policy of no organised screening (opportunistic) in the UK. The screening strategy modelled annual rounds for people aged 16 to 24 years. The Cobas Amplicor CT (Roche Diagnostics, Basel) test was used for both population screening and background screening. Notification of partners was assumed to take place at the general practice surgery. The evaluation was based on three comparisons. These were screening women only versus no organised screening; screening men and women versus no organised screening; and screening men and women versus screening women only.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis.

Study population
The hypothetical population was composed of 50,000 men and women aged between 12 and 62 years. Each year, all members of this population who were aged 16 to 24 years were invited to participate.

Setting
The setting was mainly primary care (outpatient). The study was conducted for central and southwest England.

Dates to which data relate
The effectiveness data were obtained from 2000 to 2007. The resource use and cost data were published in 2007 and reported in prices from 2005.

Source of effectiveness data
The clinical and epidemiological data included a series of outcomes relating to the transmission and progression of chlamydial infection and the progression of infection to severe outcomes (severe pelvic inflammatory disease (PID), ectopic pregnancy, infertility and neonatal complications). They also included other inputs relating to the coverage and uptake of screening, the effectiveness of partner notification, and test performance characteristics of laboratory tests. Building and the dissolution of partnerships was also incorporated, as well as general mortality. The exact values of prevalence of chlamydia by age were determined as part of the calibration process.

Modelling
A transmission dynamic simulation model was developed on the basis of previous models, and used discrete event simulation. This simulated, on a daily basis, the relevant events of the population, taking partnerships and matching
patterns into consideration. After an initial warm-up period, the model was run 40 times, with a time horizon of 15,000 days, to compare the two strategies. Input parameters of the model, main assumptions and calibration results were adequately described, and the reader was referred to the full report of the study for additional details (Low et al. 2007, see ‘Other Publications of Related Interest’ below for bibliographic details).

Sources searched to identify primary studies
An important part of the information came from empirical data collected within the chlamydia screening studies (ClaSS) project in the UK. Other nationally representative data were used when available. Long-term complications were taken from a cohort study of women in Uppsala, Sweden, as no UK data were available. For main inputs of transmission and progression, the main sources were published models.

Methods used to judge relevance and validity, and for extracting data
As already reported, parameters came from empirical data when available. No specific details of the methods used to obtain data from other sources were reported, but the reader was referred to the full report (Low et al. 2007).

Measure of benefits used in the economic analysis
The measure of benefit was “major outcome averted”. A “major outcome” was defined as the occurrence of at least one episode of PID leading to hospital admission, ectopic pregnancy, infertility, or neonatal complications due to chlamydia. Discounting was performed at a rate of 3.5%.

Direct costs
The primary cost and resource use data, including the private costs to patients of participating in the screening programme, were prospectively collected and reported in detail elsewhere (Robinson et al. 2007, see ‘Other Publications of Related Interest’ below for bibliographic details). The costs of running the chlamydia screening studies project, including laboratory staff and tests, treatment and partner notification, were used as a proxy for NHS costs. The unit costs were reported clearly. The costs were converted to 2005 prices using the combined hospital and community index. Discounting was performed at a rate of 3.5%.

Statistical analysis of costs
The results were mainly reported as deterministic data.

Indirect Costs
The patient's private costs of screening were included when reporting a societal perspective, but they were not reported in detail.

Currency
Pounds sterling (GBP). 

Sensitivity analysis
Different one-way or scenario sensitivity analyses were performed. Such analyses investigated the private cost to individuals, variations in response rates and screening intervals, the discount rate, the incidence of PID (including a scenario of high uptake and high incidence of PID, and variations in the costs of PID and infertility. The values used were justified.

Estimated benefits used in the economic analysis
After the introduction of home-based postal screening, the prevalence of chlamydia dropped to a new equilibrium
value, particularly in the younger age groups in whom prevalence was higher (supplementary figures were posted on the ClaSS project website www.chlamydia.ac.uk). Benefits were represented graphically over time.

PID and neonatal complications were the most frequently averted outcomes. The graph showed that, at 10 years, about 5 to 20 PIDs, -2 to 2 ectopic pregnancies, 1 to 3 infertility episodes, and 5 to 12 neonatal complications were averted in the different screening approaches.

**Cost results**
The total costs of the alternatives being compared were not reported.

**Synthesis of costs and benefits**
In the base-case, the incremental cost effectiveness ratio (ICER) per major outcome averted for screening men and women was, after 8 years, approximately 28,900 in comparison with no organised screening.

Screening women only was less costly but also less effective. The ICER was approximately 22,300.

The model was highly sensitive to the probability of developing PID as well as its costs. For example, a probability of PID of 25% and an assumption that all cases were admitted to hospital led to an ICER of 10,200. The model was also sensitive to the uptake of screening.

A gradual fall in the ICERs over time was observed. This reflected the lag seen in a screening programme before the full effect on the major outcomes is achieved.

Eighteen different scenarios were presented for each of the three comparators. These had various screening response rates, screening intervals, discount rates, PID costs and other sensitive cost and epidemiologic parameters.

The most favourable scenario was when the incidence of major outcomes and screening uptake increased, where the ICER fell to 6,200 per major outcome averted for screening women only.

The inclusion of the patient's private costs of attending for screening raised the ICER of screening men and women to 41,300.

**Authors' conclusions**
Unlike previous studies, this study indicated that, on the basis of contemporary data from England, proactive register-based screening for chlamydia was not cost-effective.

**CRD COMMENTARY - Selection of comparators**
The two screening modalities compared, as well as the screening strategies themselves, were adequately described and justified for the setting in England. The authors stated that the comparator (no organised screening or opportunistic screening) was chosen to represent current local practice.

**Validity of estimate of measure of effectiveness**
The authors chose a range of health outcomes related to chlamydia. They seem to have adequately derived the programme effectiveness from data about screening uptake, diagnostic test characteristics and partner notification.

**Validity of estimate of measure of benefit**
A combined measure using major outcomes prevented was derived, which mixed events with different health and cost implications (e.g. infertility, PID). The authors justified not reporting quality-adjusted life-years (QALYs) given the paucity of adequate data on related events. Nevertheless, when using one source of QALY weights for PID, the base-case ICER in terms of the incremental cost per QALY was more than 0.5 million per QALY. Though incremental effects were clearly reported, the total benefits for each strategy were only presented in a graph.
Validity of estimate of costs
All the relevant cost categories and their components seemed to have been included for the base-case (NHS) perspective. Nevertheless, there was less detail in the paper when reporting an alternative societal perspective that included the additional private costs to the patient of attending for screening. Much of the resource use and cost data were prospectively collected as part of the project. Discounting was appropriately applied to long-term costs and effects, and most of the cost data was adequately reported. A limitation was the lack of reporting the total costs of each strategy, both for the base-case and the other scenarios.

Other issues
The authors adequately compared their study methods and results with those of other relevant studies, and explained the possible reasons for discrepancies in the findings. The issue of generalisability to other settings was not directly addressed. The authors do not appear to have presented their results selectively.

The authors stated some further limitations of their study. First, the complexity of the model. Second, the fact that the results were based on a single series of assumptions about mixing of partners and background rates of opportunistic screening (which was consistent with empirical data). Third, the inability to depict parameter uncertainty producing 95% confidence intervals (as the clinical parameters were the results of calibration to the empirical data).

Implications of the study
If the uptake of screening and incidence of complications were based on contemporary empirical studies, these data would be relevant to discussions about the cost-effectiveness of the opportunistic model of chlamydia screening used in England. Areas of further research include the possibility of achieving optimal coverage and uptake using a mixed model that combines elements of opportunistic and systematic screening, the rigorous evaluation in randomised controlled trials of the relative effectiveness and cost-effectiveness of alternative screening strategies, and the acquisition of more reliable data about the long-term sequelae. Using the authors' realistic estimates, the study showed that screening was an expensive intervention that probably did not represent good value for money.

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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**
Adolescent; Adult; Chlamydia Infections /economics /epidemiology /prevention & control; Chlamydia trachomatis; Cost-Benefit Analysis; England /epidemiology; Female; Humans; Infertility /microbiology; Male; Mass Screening /economics /methods; Pelvic Inflammatory Disease /microbiology; Pregnancy; Pregnancy, Ectopic /microbiology; Prevalence; Quality-Adjusted Life Years; Time Factors; Treatment Outcome

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