REVIEW

Screening for *Chlamydia trachomatis*: a systematic review of the economic evaluations and modelling

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Objective: To review systematically and critically, evidence used to derive estimates of costs and cost effectiveness of chlamydia screening.

Methods: Systematic review. A search of 11 electronic bibliographic databases from the earliest date available to August 2004 using keywords including chlamydia, pelvic inflammatory disease, economic evaluation, and cost. We included studies of chlamydia screening in males and/or females over 14 years, including studies of diagnostic tests, contact tracing, and treatment as part of a screening programme. Outcomes included cases of chlamydia identified and major outcomes averted. We assessed methodological quality and the modelling approach used.

Results: Of 713 identified papers we included 57 formal economic evaluations and two cost studies. Most studies found chlamydia screening to be cost effective, partner notification to be an effective adjunct, and testing with nucleic acid amplification tests, and treatment with azithromycin to be cost effective. Methodological problems limited the validity of these findings: most studies used static models that are inappropriate for infectious diseases; restricted outcomes were used as a basis for policy recommendations; and high estimates of the probability of chlamydia associated complications might have overestimated cost effectiveness. Two high quality dynamic modelling studies found opportunistic screening to be cost effective but poor reporting or uncertainty about complication rates make interpretation difficult.

Conclusion: The inappropriate use of static models to study interventions to prevent a communicable disease means that uncertainty remains about whether chlamydia screening programmes are cost effective or not. The results of this review can be used by health service managers in the allocation of resources, and health economists and other researchers who are considering further research in this area.

Screening for genital chlamydia is widely reported to be a cost effective intervention.[1] This implies that any additional benefits achieved by preventing serious morbidity such as that caused by pelvic inflammatory disease and its consequences are worth the additional costs to the health service of implementing screening and treatment for asymptomatic chlamydia infections in the target population.

To provide valid information that can inform health policy, economic evaluations of chlamydia screening programmes must be based on an appropriate model of the disease process and realistic estimates of the incidence of the disease and its consequences.[2] Modelling approaches such as decision analysis models, which include decision trees and Markov models, have commonly been used to evaluate chlamydia screening. These models are referred to as ''static'' because they assume a constant force of infection,[3] which is inappropriate because they cannot take into account the impact of re-infection, continued transmission, and the change in prevalence over time that might result from a screening programme. In the case of chlamydia, on the one hand individuals who are screened and successfully treated are returned to the susceptible state but will not further infect other individuals, but on the other they risk being re-infected if they return to an untreated partner. The overall balance of these opposing forces can only be determined in a transmission ''dynamic'' modelling approach.

We undertook this systematic review to assess the evidence for the cost effectiveness of different approaches to chlamydia screening in both men and women, taking into account the appropriateness of the models used; assess the data requirements for an economic and epidemiological simulation model; and identify areas of uncertainty that should be explored in a full economic evaluation of chlamydia screening. The review formed part of the Chlamydia Screening Studies (ClaSS) project, a multidisciplinary series of studies that examined epidemiological, laboratory, social, and economic aspects of chlamydia screening.[4 5]

METHODS

The full protocol is available at www.chlamydia.ac.uk/econeval.htm. We searched 11 electronic bibliographic databases from the earliest date available to August 2004 using a search strategy that included key words such as chlamydia, pelvic inflammatory disease, economic evaluation, and cost (see table 1 on *STI* website).

Inclusion criteria

Participants

Males and/or females aged 14 years and above.

Interventions

Any form of screening intervention for *Chlamydia trachomatis*, including both non-selective and selective opportunistic or population screening. We also included studies that reported

Abbreviations: ClaSS, Chlamydia Screening Studies; ICER, incremental cost effectiveness ratio; MOA, major outcome averted; NAAT, nucleic acid amplification test; NSO, non-selective opportunistic screening; NSP, non-selective population screening; SO, selective opportunistic screening; SP, selective population screening; TDM, transmission dynamic model

on diagnostic tests, contact tracing, and treatment as part of a screening programme.

Outcomes
Principal outcomes were cases of chlamydia identified and major outcomes averted (pelvic inflammatory disease, ectopic pregnancy, or infertility). Secondary outcomes such as neonatal complications were also considered.

Studies
Formal economic evaluations, including cost effectiveness analysis, cost utility analysis, cost benefit analysis, and cost minimisation analysis; primary studies of the costs and uptake of screening.

Selection of papers for review
The initial search was carried out in 2000 and was finally updated in August 2004. Two investigators (TR, SR) carried out the review using methods that have been described in detail elsewhere.[6] We assessed the quality of included studies using criteria that were adapted from published guidelines and had been used previously (box).[6 7] In the first instance the quality of economic aspects of the studies was assessed. Papers failing more than two quality criteria were excluded. Papers failing two items were reviewed to identify key messages contained in the papers and marked with a query. Papers that failed just one or none of the items were reviewed in full and marked with a pass. In the second stage we recorded the modelling approach and assessed qualitatively the appropriateness of the methods.

We classified screening interventions into one of four types, based on Wilson and Jungner's definitions: (a) non-selective population screening (equivalent to mass screening); (b) selective population screening (equivalent to selective screening of high risk groups in the population); opportunistic screening (originally described as surveillance), which could be (c) selective, or (d) non-selective.[8] We used the term population based (also referred to as active or systematic) screening to refer to interventions where a group of individuals not seeking health care was invited to be screened. Opportunistic screening included all interventions where a screening test was offered to individuals already attending health services for another reason. We used our own judgment to classify interventions except where study investigators specified the type of screening intervention.

Quality assessment criteria

General quality criteria
- The research question is stated, implied, or apparent and the rationale for the choice of alternative interventions for comparison should be given
- The viewpoint(s) of the analysis are stated or implied
- The source(s) of effectiveness estimates used are stated, implied, or apparent and appropriate
- The primary outcome measure(s) are stated, implied, or apparent
- Quantities of resources are reported separately from their unit costs, or can be derived
- Currency and price data are recorded
- Details of currency or price adjustments for inflation or currency conversion are given (if appropriate)
- The discount rate is stated or is apparent, and is justified (if relevant)
- Details of any modelling used in the economic study are given

Quality of modelling approach
- The choice of model used and the key parameters on which it is based are justified/appropriate

Source
Adapted from Roberts *et al*[6] and Mugford.[7]

RESULTS
Our search identified 713 papers (fig 1). Of these, 327 were considered potentially relevant. We reviewed 190 papers in full: none of those of uncertain relevance (category C) fulfilled our inclusion criteria and all other papers in this category were excluded. There were 57 formal economic evaluations and two cost studies. Of 59 papers that were assessed for quality four were subsequently excluded.[9–12] No studies were excluded on the basis of an inappropriate modelling approach but details of the model were documented and taken into account in the interpretation of the results. Details of all included studies are summarised in (see table 2 on *STI* website).

Studies of chlamydia screening interventions
Twenty nine papers had a primary focus of screening. The characteristics of these studies are summarised in table 1. Twenty five papers evaluated selective opportunistic screening,[13–21] including two cost studies.[22 23] or non-selective opportunistic screening.[24–37] The majority of these papers concluded that opportunistic screening was cost effective.

Only two papers, examining non-selective opportunistic screening, used a transmission dynamic model that incorporated the effects on chlamydia transmission of re-infection and partner notification.[28 29] Welte *et al* suggested that

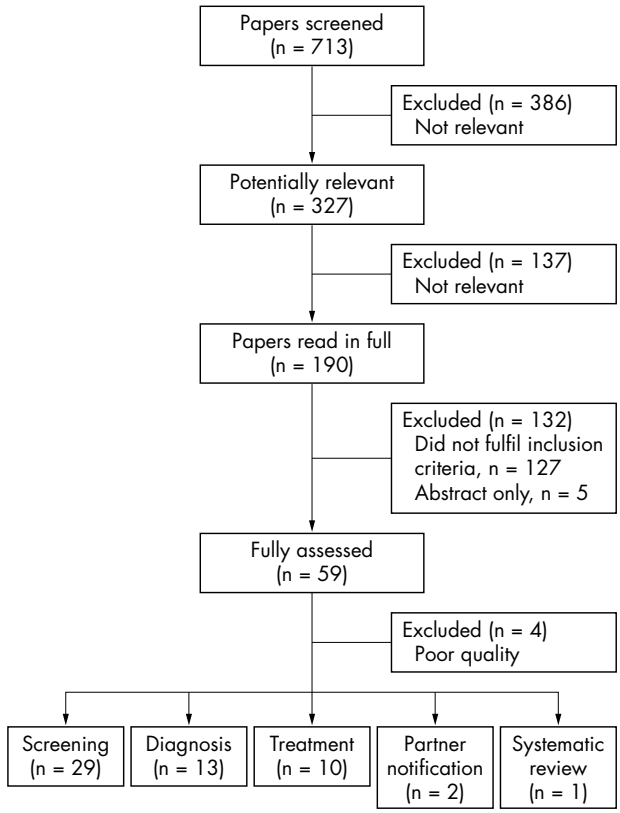

Figure 1 Flow diagram of selection of economic evaluations of chlamydia screening.

Table 1 Summary of characteristics of economic evaluations of chlamydia screening interventions, in chronological order

	Type of screening				Outcome		Model		Target population			Cost effectiveness, screening recommended		
First author, year, reference	SO	SP	NSO	NSP	MOA	Short term	Static	TDM	F	M&F	M	Yes	No	Comments
Adams, 2004[22]	√				n/a		None		√			–		Cost study only
Hu, 2004[24]	√				√		√		√			√		Annual screening women 15–29 years cost effective. Cost per quality adjusted life year (QALY) reported
Blake, 2004[13]	√						√				√	√		Universal NAAT screening most cost effective
Ginocchio, 2003[26]			√	√	√		√				√	–		Cost effectiveness if test costs <$18
Mehta, 2002[25]			√			√	√			√		√		Mass treatment most cost effective
Wang, 2002[41]				√	√		√			√		√		School based screening cost saving
Postma, 2001[14]	√				√		√			√		–		Partner notification improves cost effectiveness
Van Valkengoed, 2001[42]				√	√		√		√				√	NSP screening women 15–40 years not cost effective
Goeree, 2001[37]	√				√		√		√			–		Screening high risk women most cost effective
Postma, 2001[27]			√		√		√		√			√		Screen women under 30 years
Welte, 2000[28]			√		√			√		√				Screening may be cost saving in long run. High estimated probability of complications
Townshend, 2000[29]			√		√			√		√		√		Screening cost saving after 4 years. Poor reporting of cost data
Howell, 2000[39]		√			√		√		√			√		Screening army recruits is cost effective
Shafer, 1999[15]	√				√		√					–		ICER presented. Judgment unclear
Howell, 1999[40]		√			√		√		√			√		Age based screen cost saving
Howell, 1998[30]			√		√		√		√			–		Age based screening most cost effective
Gunn, 1998[23]	√					√	None				√	–		Result presented as cost per case
Paavonen, 1998[31]			√		√		√		√			√		NSO screening cost effective even at low prevalence
Genc, 1996[32]			√			√	√			√		–		Cost effective under specific conditions
Marrazzo, 1997[33]			√		√		√		√			√		Screening in FP/STD clinics cost saving
Genc, 1993[34]			√		√		√				√	–		Cost effective under specific conditions
Sellors, 1992[16]	√					√	None		√			–		SO screening cost effective compared to NSP
Nettleman, 1991[17]	√					√	None		√				√	Not cost effective to screen all pregnant women
Buhaug, 1989[18]	√				√		√		√			√		Testing cost effective for women <24 yrs only
Buhaug, 1989[19]	√				√		√		√			√		Testing cost effective for women 18–24 years only
Begley, 1989[35]			√			√	None			√		√		Screening in FP clinics is cost effective
Skjeldestad, 1988[20]	√					√	None		√			–		Screening for women seeking abortion
Trachtenberg, 1988[21]	√				√		√		√			√		Screening asymptomatic women is cost effective
Phillips, 1987[36]			√			√	√		√			√		Testing for *C. trachomatis* is cost effective

SO, selective opportunistic screening; SP, selective population screening; NSO, non-selective opportunistic screening; NSP, non-selective population screening; MOA, major outcome averted; TDM, transmission dynamic model; M, males; F, females; NAAT, nucleic acid amplification test; ICER, incremental cost effectiveness ratio; ''–'' implies that screening is only cost effective under certain conditions or against certain comparators.

opportunistic screening of asymptomatic heterosexual men and women attending general practices would become cost saving after about 5 years if over 90% of eligible individuals were screened annually.[28] Townshend and Turner evaluated various chlamydia screening scenarios including opportunistic screening at general practices of men and women 20–40 years, using a hypothetical cohort and literature based cost and effectiveness data.[29] This model informed the Chief Medical Officer's Expert Advisory Group report and concluded that screening was broadly cost effective.[38]

The report suggested that the proposed screening programme would prevent significant numbers of infertility cases annually, depending on the probability of infertility following an episode of pelvic inflammatory disease, and that the screening programme could pay for itself after 4 years.

The remaining studies evaluated either selective population screening (in female army recruits)[39 40] or non-selective population screening.[41 42] In an evaluation most similar to the ClaSS project, van Valkengoed *et al* evaluated chlamydia screening using home collected and mailed specimens in women. Using a static model they concluded that postal screening with an uptake of 50%, targeted to 15–25 year olds, was not cost effective at expected levels of prevalence.[42]

Partner notification

Three papers investigated partner notification in detail.[14 43 44] Postma *et al*[14] acknowledged the limitations of their use of a static model and proposed it as a first step to exploring the relative cost effectiveness of successful partner notification. The summary data for these studies are presented in table 2.

Diagnostic testing

Thirteen papers focused on diagnostic testing in chlamydia screening programmes (table 3). The range of alternative testing procedures and samples made it impossible to identify the single most cost effective test. The papers fell into two broad categories: those looking at short term (restricted) outcomes such as test and treat only,[45–51] and those attempting to use longer term outcomes such as major outcome averted.[52–56] Only one paper explicitly acknowledged the use of a restricted outcome as a partial evaluation and recommended further work before robust policy recommendations could be made.[46] Only one paper used an appropriate transmission dynamic model to compare two nucleic acid amplification tests with an enzyme immunoassay but this study was considered flawed for other reasons.[57] Summary details of the remaining five papers are presented in table 3. Full details on all papers are presented in table 2 on the *STI* website.

Treatment

There were 10 papers with a primary focus of treatment (table 4). Seven of these compared azithromycin (1 g single dose) with doxycycline (100 mg twice daily for 7 days).[58–64] All studies assumed 100% compliance for azithromycin in their base case analysis but 75–87% for doxycycline. Five studies recommended single dose azithromycin as the treatment of choice[60–63] on cost effectiveness grounds, assuming that incomplete adherence led to more treatment failures. Of the three remaining papers, two looked at alternative antibiotic treatment comparisons[65 66] and one focused on pregnant women.[67]

Other characteristics of studies

In terms of analytical approach, 12 studies used no model, 34 studies used a static decision tree, two used Markov chain models,[19 37] one used an unspecified simulation model,[18] and one an undefined "mathematical model."[63] The most recent paper used a state transition model.[24] Only three papers used

Table 2 Summary of characteristics of economic evaluations of partner notification for chlamydia infection, in chronological order

First author, year, reference	Partner notification strategy			Outcome		Model		Target population			Cost effectiveness, screening recommended		
	M partners of F	F partners of M	Either	MOA	Short term	Static	TDM	F	M&F	M	Yes	No	Comments
Postma, 2001[14]*	√			√		√		√			√		PN improves cost effectiveness by 50%
Howell, 1997[44]			√		√	√			√		√		PN more cost effective for female partners of male cases than male partners of female cases
Katz, 1988[43]			√		√	None			√				Field follow up by trained investigators most cost effective

*Study also included in table 1.
MOA, major outcome averted; TDM, transmission dynamic model; M, males; F, females; PN, partner notification.

Table 3 Summary of characteristics of economic evaluations of diagnostic tests for use in chlamydia screening, in chronological order

	Diagnostic test			Outcome		Model		Target population			Cost effectiveness, screening recommended		
First author, year, reference	NAAT	EIA	Other	MOA	Short term	Static	TDM	F only	M&F	M only	Yes	No	Comments
Mrus, 2003[45]	C		√		√	√			√		–		Urine LE test produced lowest ICER
Sahin-Hodogugil, 2003[52]			√		√	√		√			√		Joint focus with treatment. Mass treatment with doxycline was most cost effective strategy
Browning, 2001[48]	√		C		√	None			√		–		SDA assay best test in genitourinary clinics
Scoular, 2001[46]	√	C			√	None		Not specified			√		Testing with LCR would provide health gains
Nyari, 2001[53]			√	√		√		√			√		Screen by amplified Gen-Probe is best
Knight, 2000[57]	√			No outcome			√	√			–		Cost study only. LCR lowers costs but global screening not cost effective
Kacena, 1998[54]	√				√	None					–		Pooling study. Pools of 4 reduces cost at prevalence <8%
Peeling, 1998[47]	√		C		√	None				√	–		Targeted screening reduces costs in Canada
Howell, 1998[55]	√	C	C	√		√		√			–		LCR on cervical specimens most cost effective
Dryden, 1994[49]		√	C		√	None			√		–		Result presented as cost per infection cured
Sellors, 1993[50]	√		C		√	None				√	–		LE urine strip accurate at lower cost than NAAT
Estany, 1989[56]			√	√		√		√			–		DFA and EIA cost effective for given prevelance
Nettleman, 1988[51]			√		√	√			√		√		Culture compared to antigen testing not cost effective

C, comparator; NAAT, nucleic acid amplification test; PCR, polymerase chain reaction; SDA, strand displacement analysis; LCR, ligase chain reaction; LE, leucocyte esterase test; EIA, enzyme immunoassay; DFA, direct fluorescent antibody test; MOA, major outcome averted; TDM, transmission dynamic model, M, male, F, female; ICER, incremental cost effectiveness ratio.

Table 4 Summary of characteristics of economic evaluations of chlamydia treatment, in chronological order

	Treatment		Outcome		Model		Target population			Cost effectiveness, screening recommended		
First author	AZM *v* Doxy	Other*	MOA†	Short term‡	Static	TDM	F only	M&F	M only	Yes	No	Comments
Gift, 2004[64]	√		√		√		√				√	Coinfection with gonorrhoea. Routine dual treatment not a cost effective replacement for testing
Moriarty, 2001[63]	√			√	√		√			AZM		Azithromycin significantly more cost effective
Petitta, 1999[58]	√			√	√			√				Both treatments decreased infection and costs
Marra, 1997[62]	√			√	√		√			AZM		Azithromycin recommended treatment
Hueston, 1997[67]		√		√	√		√			AZM		Azithromycin most cost effective
Genc, 1997[59]	√			√	√			√				Doxycycline most cost effective when compliance assumed >80%
Magid, 1996[61]	√		√		√					AZM		Azithromycin most cost effective
Haddix, 1995[60]	√			√	√		√			AZM		Azithromycin most cost effective
Schiotz, 1992[65]		√	√		√							Routine test of cure after treatment for chlamydia not cost beneficial
Washington, 1987[66]		√		√	√		√					Combined treatment more cost effective than tetracycline

AZM, Aazithromycin; Doxy, doxycycline; MOA, major outcome averted; TDM, transmission dynamic model, M, male, F, female; ICER, incremental cost effectiveness ratio.
*Other treatments include amoxycillin, erythromycin; †Major outcome was pelvic inflammatory disease; ‡short term outcomes usually cost per patient cured.

an appropriate transmission dynamic model—one system dynamic approach[29] and two discrete event simulation models.[28 57] Of 31 studies that focused on screening or partner notification 18 considered programmes that screened women only. Only three studies considered screening both women and men.[28 29 35]

Overall, 23 studies used a restricted outcome of ''cost per case detected.'' The remaining economic evaluations including the three dynamic modelling studies[28 29 57] used ''major outcome averted'' (MOA) or equivalent outcomes, which typically referred to cases of pelvic inflammatory disease, ectopic pregnancy, and infertility. Information about the risk of developing major outcomes was usually stated to be based on published literature. The probability of developing pelvic inflammatory disease following chlamydial infection was generally in the range of 0.25 to 0.30. Only one study conducted extensive sensitivity analyses according to assumptions about the number of pelvic inflammatory disease cases averted and the probability of infertility and found that these have a significant impact on the estimate of cost effectiveness.[29]

DISCUSSION

This systematic review identified a substantial number of economic evaluations addressing different aspects of chlamydia screening. Most of these studies found both opportunistic and population based chlamydia screening to be cost effective, partner notification to be an effective adjunct to a chlamydia screening programme, and testing with nucleic acid amplification tests and treatment with azithromycin to be cost effective. Three main methodological issues threaten the validity of these findings. Firstly, most studies used a static modelling approach that is inappropriate for the study of infectious diseases. Secondly, restricted outcomes such as cost per case detected should not be used as a basis for policy recommendations. Thirdly, most studies did not acknowledge or investigate the uncertainty associated with probability estimates for the long term sequelae associated with chlamydia infection. A recent paper has estimated much lower probability estimates for the proportion of untreated infections that result in pelvic inflammatory disease compared to the estimates typically used in the published economic evaluations.[68]

Strengths and weaknesses

The strengths of this study are that, to our knowledge, it provides the most comprehensive review to date of economic evaluations of screening, partner notification, diagnostic, and treatment aspects of chlamydia screening programmes and it is the first review in this area to critique the quality of modelling approaches used in the evaluation. The main weakness of the review is that poor methodological quality, or at least reporting of the methodology, made it difficult to interpret the findings or to draw conclusions.

Comparison with other studies

We identified one other systematic review. Honey *et al* reviewed economic evaluations of screening for chlamydia in women in primary care settings only.[1] The outcomes assessed were cases of pelvic inflammatory disease prevented or cases of chlamydia detected and the review concluded that screening women for chlamydia in primary care is cost effective. This conclusion is potentially misleading because the conclusions were based on the results of studies that used a restricted outcome such as cost per case detected, or whose results were derived from static models.[2] The authors did not discuss these limitations. This review highlighted the poor quality of data on long term outcomes associated with chlamydia, which was supported by our findings.

Economic evaluations of infectious diseases

Infectious diseases such as chlamydia present specific challenges for economic evaluation. The interactions between individuals with sexually transmitted infections mean that the risk of infection depends on background prevalence, the fact that screened and treated individuals will not transmit, but are susceptible to re-infection, and that untreated sexual partners can also continue to transmit infection. Most healthcare interventions do not involve interactions between individuals receiving the intervention and static models, such as decision tree analysis and Markov chain models, which assume that individuals are independent, are ideal for these situations.[69] Only transmission dynamic models can evaluate all the effects of an infectious disease. There are two main transmission dynamic approaches that can take into account the full economic consequences of interpersonal interactions: discrete event simulation (which works at an individual level) and system dynamics (aggregated level).[69] These methods provide more realistic representations of complex systems but are computationally more complex. A recent study comparing static and dynamic models in an economic evaluation of chlamydia screening, found that the different modelling approaches produced different results.[70]

Since 2000 both discrete event simulation[28 71] and system dynamics[29] have been used to model the transmission of chlamydia and the cost effectiveness of screening. Despite increasing recognition of the importance of using an appropriate modelling approach,[24] nine other economic evaluations of chlamydia screening published since 2000 used static models.[13 14 24–26 37 41 42 45] This might reflect publication lead time but probably also reflects the view that the simplicity of static models outweighs their inherent limitations, mainly their inability to cope with interdependence of individuals. The most recent economic evaluation in our review attempted to incorporate the transmission dynamics of chlamydia into a (static) state transition model by using population averages for variables such as rates of partner change and sexual mixing.[24] While there are some circumstances, such as immunisation programmes for highly transmissible infections, in which the results from static models approximate those of a dynamic model, and cohort models nearly always underestimate the cost effectiveness of interventions,[72] the same conditions do not apply in chlamydia screening, where lasting immunity is not a strong feature of infection.

Cost effectiveness of chlamydia screening

The two high quality cost effectiveness analyses based on dynamic modelling both suggested that opportunistic chlamydia screening would pay for itself or be cost saving after 4–5 years.[28 29] These conclusions are, however, called into question by other methodological limitations. The study of Townshend and Turner, based on a hypothetical population, reported insufficient details of the cost data used so the results are difficult to interpret.[29] The study of Welte *et al*, which used empirical data about the coverage and uptake of opportunistic screening in primary care in the Netherlands, used published estimates for the risk of long term sequelae, and unrealistic estimates of resource use (for instance, 10 days of hospital inpatient treatment for pelvic inflammatory disease) that might be overestimated.[28] Both of these assumptions would make screening appear more cost effective.

The outcomes selected for economic evaluations are critical to the usefulness of the study for making policy recommendations. Almost half of the studies in our review used a restricted outcome such as ''cost per case detected'' for their analysis. This kind of outcome should not be used as a basis for policy recommendations because it does not give any indication of the final success of the screening programme,

particularly for an infectious disease where the consequences of transmission determine prevalence. Information on pathway, prognosis, final outcome, and resources used after detection of the disease is required.[73] Nevertheless, studies using short term outcomes continue to make policy recommendations about screening,[25 35 36] partner notification,[44] diagnosis,[46 51 52] and treatment.[60 62 63] On the other hand, the use of major outcome averted is also problematic in studies of chlamydia screening.[1] The uncertainty about the probability of developing sequelae associated with chlamydia was often not investigated in detailed sensitivity analyses, although cost effectiveness estimates are highly sensitive to this assumption.[29]

The issue of who should be targeted for screening remains controversial. The majority of studies in this review focused on screening women only. A justification for this was not usually presented but likely assumptions are that young women are most likely to access health services and that male partners would be picked up by partner notification programmes or develop symptoms and seek treatment. It is now known, however, that partner notification reaches only 50% to 60% of partners[74] and that asymptomatic chlamydia is as common in men as women.[5] Thus, the focus on women only in screening programmes risks leaving a pool of infected men in the community who can continue to spread the disease.

On the basis of this review we were unable to draw any firm conclusions about the cost effectiveness of alternative forms of chlamydia screening because of methodological flaws in most studies conducted to date. This review highlights the importance of appropriate modelling approaches and primary outcomes in economic evaluations that seek to make recommendations to influence health policy decisions. It has also drawn attention to fundamental gaps in the evidence about the probabilities of progression to long term outcomes associated with chlamydia, which limit studies even when the appropriate model and outcomes are used. We are undertaking further research to investigate in detail the impact of using alternative modelling approaches, the cost effectiveness of including men in chlamydia screening, the effects of alternative forms of partner notification, and the impact of reducing the estimated likelihood of developing chlamydia associated complications. The results of this review and future research should help to provide more reliable information about the economics of chlamydia screening to inform health policy decisions.

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CONTRIBUTORS

TER and NL are members of the team of co-applicants that designed the ClaSS study; TER designed the economic evaluation for the study, is chair of the ClaSS Economics Working Group and prepared the manuscript as the lead writer; TER and SR co-reviewed all the studies and synthesised the results; PB provided a critique on the models used in the included studies; NL provided clinical advice on the studies; SB was an adviser to the ClaSS study and the review; all authors read and approved the manuscript and provided comments on the final paper.

Two further tables are on the *STI* website (www.stjournal.com/supplemental).

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Key messages

- Economic evaluations of chlamydia screening programmes should use a transmission dynamic modelling approach in order to fully evaluate the impact of re-infection, continued transmission, and the change in prevalence over time that might result from the screening programme. Failure to do so is likely to lead to misleading results about the cost effectiveness of the programme
- The majority of published economic evaluations on chlamydia screening found opportunistic and population based chlamydia screening programmes to be cost effective but three serious methodological issues threaten the validity of these findings: inappropriate modelling approach, a restricted outcome, and uncertainty associated with probability estimates for the long term sequelae associated with chlamydia infection
- On the basis of this review we were unable to draw any firm conclusions about the cost effectiveness of alternative forms of chlamydia screening because of the methodological flaws in the majority of studies conducted to date
- This review highlights the importance of appropriate modelling approaches and primary outcomes in economic evaluations that seek to make recommendations to influence health policy decisions

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