care in the United Kingdom is currently grappling with the implementation of a series of national service frameworks covering, among others, coronary heart disease, cancers, and older people. There is concern that the sexual health and HIV strategy in England does not have the same status as the national service frameworks, and may therefore be seen as "optional," particularly as general practitioners may offer different levels of services under the proposed new general practice contract.[13]

Last, but not least, is the issue of what the long term benefits of screening will be. Since the natural history of untreated asymptomatic genital chlamydial infection is not known, and is not amenable to ethical study in humans, we have to assume that it is not significantly different from that of untreated symptomatic infection. What we do know is that studies of women with laparoscopically proved pelvic inflammatory disease (PID) have found evidence of *Chlamydia trachomatis* infection in 14%-65%, with studies in the United Kingdom most commonly reporting a detection rate of around 40% in such women.[14] Although these retrospective studies cannot prove causality, it seems reasonable to assume that many of the *C trachomatis* infections contributed to the tubal damage. It has also been reported that about 20% of women referred to infertility clinics have tubal damage that is thought to be due to infection, the most common aetiology of which is likely to be *C trachomatis*.[15] There is also the possibility that reducing the incidence of genital chlamydial infection will have a beneficial effect on rates of genital tract neoplasia.[16]

With the publication of the results of the first pilot of opportunistic screening for genital chlamydial infection, together with the demonstration of effectiveness of screening from other countries, we now have sufficient evidence to be confident that the opportunistic approach to screening is acceptable and feasible, and will result in a reduction in the prevalence of chlamydial infection. Further information is needed which will inform the costs and benefits of national screening. However, it is important at this stage that the roll out to further pilot sites includes screening in the primary care setting and general practice in particular. If roll out in these, or other settings, needs further discussion between policy makers and health professionals it must happen soon or else the major advantage of the UK approach to opportunistic screening will be jeopardised.

Sex Transm Infect 2003;**79**:3–4

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Screening

Spending money to save money

S D Mehta, M Shahmanesh, J M Zenilman

Cost effectiveness analysis to advocate *Chlamydia trachomatis* screening

In the December issue of *STI*, Honey *et al* summarise and critically review studies of cost effectiveness analysis (CEA) of *Chlamydia trachomatis* screening to provide recommendations for future screening studies.[1] The authors conclude that screening is cost effective because future sequelae of untreated infection are prevented. They point out that evidence is limited for the probabilities of sequelae of untreated infection used in CEA modelling. A second issue revolves around diagnostic testing. Chlamydia screening services have expanded as a result of the introduction of non-invasive nucleic acid amplification testing (NAAT). However, we do not know whether the natural history of NAAT detected infections is the same as culture detected infections. NAATs are 30–40% more sensitive than culture for detecting chlamydia,[2 3] and it is unknown whether NAAT positive/culture negative infections are as likely to progress to pelvic inflammatory disease (PID). Citing results by Scholes *et al*,[4] Honey *et al* urge the conduct of further clinical trials to improve the accuracy and strength of evidence of the morbidity assumptions involved in CEA of chlamydia screening. The accuracy of this information is essential, as the probability of PID subsequent to untreated infection is central to the results and conclusions of a chlamydia screening cost effectiveness analysis. For example, Scholes's analysis at the Seattle managed care organisation, which demonstrated that enhanced chlamydia screening reduced PID incidence, used

enzyme immunoassay and culture technology—both of which are now becoming obsolete in clinical practice. If NAAT detectable, culture negative infections are not as transmissible, or do not progress to PID at a similar rate, increased testing and treatment costs would not be offset by increased benefit.

Economic modelling assumes rational behaviour on the part of the decision maker, meaning that decision makers act towards an objective.[5] The assumption of rational behaviour means that decision makers choose among competing alternatives.[5] When we urge expansion of chlamydia screening and additional funds, we are asking the medical decision makers to make trade-offs between health services in a system where resources are scarce.[6] When a healthcare intervention is labelled "cost effective" this generally implies that more money can be saved in healthcare costs than spent on a particular intervention. The quantitative presentation of spending money to save money provides a persuasive argument to implement or change healthcare policy, the targets of which are clinical and public health policy makers who choose the way in which money is spent to provide value.[6] Policy makers use CEA results to decide whether a difference in effectiveness—improved health outcomes—is worth the difference in cost. Therefore it is essential that the CEA methods and results applied to chlamydia screening be explicit in describing the populations affected, the morbidity averted, and monetary resources utilised. As Honey *et al* point out the weaknesses in the chlamydia assumptions modelled, this provides medical decision makers with the opportunity to disregard the proposed theoretical benefits of chlamydia screening in favour of other healthcare services.

Beyond summarising that chlamydia screening is unsurprisingly cost effective and pointing out that studies are needed to improve accuracy of morbidity assumptions, the review provides a template for chlamydia screening CEA in general. The authors review and score the articles using criteria for economic evaluation set forth by Drummond *et al*, providing an objective evaluation of the quality of the economic analysis. The US Public Health Service Panel on Cost Effectiveness in Health and Medicine, as reported by Gold *et al*,[7] developed explicit guidelines for the conduct of CEA in health and medicine. This comprehensive text reviews measuring costs and effectiveness, evaluating outcomes, time preference and discounting, framing the analysis, and presentation of results.[4] By giving attention to existing standards for economic analysis and issues specific to chlamydia screening, the review by Honey *et al* provides a framework for future investigators conducting chlamydia screening CEA, promoting uniformity of methods and presentation of results. This brings to light the need for standardisation and consensus regarding not only the conduct of the economic analysis and probabilities of untreated chlamydia sequelae, but also other issues pertinent to the results and conclusions of chlamydia screening CEA: outcome cost assumptions, sequence of outcomes, definition of effectiveness, and presentation of results.

Key message

Cost effectiveness analysis (CEA) can be a persuasive argument when we urge expansion of chlamydia screening. In addition to following CEA guidelines, we need to develop explicit guidelines for chlamydia screening CEA, with standardisation and consensus from experts in the fields of STD research, policy, and economics. Comprehensive attention to constructing and conducting chlamydia screening CEA will provide the strongest argument possible to advocate changing policy.

Four of the studies reviewed by Honey *et al* modelled direct healthcare and indirect costs. Indirect costs include lost income and productivity. These raise the questions of whether or not costs should include only direct medical costs, and under which circumstances direct non-medical and indirect costs should be included. Clearly, those analyses that do not include indirect costs will be more conservative in their results and conclusions. Furthermore, there is disagreement and lack of evidence regarding the sequence in which sequelae occur. The sequence in which the probability that advanced sequelae (chronic pelvic pain, ectopic pregnancy, infertility) occur subsequent to PID varies by study. Among the papers reviewed by Honey *et al*, Howell *et al* and Marrazzo *et al* applied these probabilities to all women who develop PID[8 9]; while the paper by Paavonen *et al* did not apply the probability of occurrence of advanced sequelae to women who had operative treatment for PID.[10] These advanced sequelae are costly and their inclusion or exclusion may affect the results and conclusions. Similarly, as Honey *et al* point out, the definition of the effectiveness unit (that is, the outcome measures) varied between studies—cases of PID prevented or cases of chlamydia detected and cured. The use of different effectiveness units may cause difficulty in comparing results of different studies. CEA results may be presented as average cost effectiveness, incremental cost effectiveness, or marginal cost effectiveness. When multiple screening strategies are being compared, it would be helpful to know which presentation is most useful to policy makers and researchers in the field.

Several guides for economic analysis discuss the relevance of analytic perspective to decision making,[6 7 11] as the monetary benefits of a chlamydia screening programme would accrue to the source responsible (payer) for the costs of the intervention and sequelae of untreated infection over the entire analytic horizon. It is not likely in the United States, where insurance is paid by the employer, for example, that a payer would be responsible for the costs of a woman and her family for 10 years (the time over which the full range of chlamydia sequelae are expected to occur). Therefore, CEA for chlamydia screening in the United States are conducted from the societal perspective to realise the prevented morbidity and associated monetary benefits. In contrast, healthcare expenditure in Great Britain largely takes the single payer perspective, as the National Health Service (NHS) provides primary and preventive care for all registered people. Therefore, the societal perspective CEA more accurately reflects the monetary savings that would accrue to the NHS through a cost effective chlamydia screening programme. However, even here, since budgets are allocated annually, even the proposed triannual budgeting will disadvantage NHS trusts which financially underwrite screening, as they are unlikely to "benefit" directly from the reduced long term complication rates.

Honey *et al* point out deficiencies in the availability and strength of evidence of the probabilities of sequelae of untreated chlamydia infection. By casting light on the quality of CEA in chlamydia screening, this review also reveals the need for accuracy, standardisation, and carefully drawn consensus by experts in the field for numerous other issues. There is an opportunity for health economists, healthcare policy makers, and STD researchers to form a consensus panel to develop guidelines for economic analysis of chlamydia screening programmes to comprehensively address each step involved in CEA of chlamydia screening. Comprehensive attention to constructing and conducting CEA will provide the strongest argument possible to advocate changing chlamydia screening policy, making it difficult to disregard the public health benefits of chlamydia screening based on methodological or analytical weaknesses.

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CONTRIBUTORS

SM helped develop the focus of the article and wrote the first draft of the paper; MS helped

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