Control of Chlamydia trachomatis infections in female army recruits: cost-effective screening and treatment in training cohorts to prevent pelvic inflammatory disease
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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
Three interventions for Chlamydia trachomatis infections in women beginning army training. The strategies at entry into the 8-week basic training programme consisted of an educational encounter in addition to: targeted screening of women age 25 years or younger using urine ligase chain reaction (LCR) (Abbott Laboratories, Abbot Park, IL), universal testing of all women using urine LCR, and universal antibiotic therapy.

Type of intervention
Screening, treatment and primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
A hypothetical cohort of women volunteers beginning army training with the intention of staying in the army for at least 2 years, and who were not seeking medical care.

Setting
Army training centre (army medical centre). The economic study was carried out in the USA.

Dates to which data relate
Effectiveness and resource use data were extracted either from the literature published between 1991 and 1998, or from a screening study performed in Fort Jackson, SC (the US Army's largest military basic training establishment) and whose results were published in 1998, and Fort Jackson records. The price year was 1995.

Source of effectiveness data
The evidence for final outcomes was based on the literature review, including a single screening study performed in Fort Jackson (Fort Jackson study).

Modelling
A decision analytic model was developed using DATA 3.0 (TreeAge, Williamstown, MA) to estimate costs and effects associated with each strategy over a time horizon of 1 year (which was extended to 2 years in the sensitivity analysis).

Outcomes assessed in the review
The following outcomes were assessed:
Chlamydia prevalence,
sensitivity and specificity of urine LCR,

the percentage of LCR positives who were aged 25 or younger,

the percentage of LCR-positive women who would be administered a single dose (1 gram) of azithromycin and its effectiveness,

percentage of treated women who would experience moderate to severe side effects and require clinic visit,

the percentage of volunteer women beginning basic training who drop-out of training for reasons unrelated to Chlamydia infection,

attrition rate for the first year in the Army after basic training,

the percentage of women remaining in the army with uncured Chlamydial infections who would develop PID (pelvic inflammatory disease) and the proportion those who would develop symptoms,

the percentage of women with symptomatic PID who would require inpatient treatment,

the percentage of women who would be discharged from the military within their first 6 months of service because of development of symptomatic PID,

the percentage of women with PID (symptomatic or asymptomatic) who would develop CPP16 and would require an inpatient visit, and attrition rate in second year.

Study designs and other criteria for inclusion in the review
Chlamydia prevalence and the percentage of LCR positives who were aged 25 or younger, were based on Fort Jackson study involving the screening of 13,204 female trainees, 87.9% of whom were aged 25 or younger. The study patients came from diverse ethnic and geographic backgrounds and were not seeking medical care. This study found age (25 years old or younger) to be a feasible and reliable predictor of Chlamydia infection. No details were given on other studies included in the review.

Sources searched to identify primary studies
Not reported.

Criteria used to ensure the validity of primary studies
Not reported.

Methods used to judge relevance and validity, and for extracting data
Not reported.

Number of primary studies included
A total of 9 studies plus Fort Jackson records were included in the review.

Methods of combining primary studies
Not reported.
Investigation of differences between primary studies
Not reported.

Results of the review
The outcomes considered in the base case analysis were as follows:

- Chlamydia prevalence was 9.2%.
- Sensitivity of urine LCR was 88.6% and specificity was 99%.
- 95.3% of LCR positives were aged 25 or younger.
- 100% of LCR-positive women were administered a single dose (1 gram) of azithromycin which was 96% effective.
- 6.4% of treated women experienced moderate to severe side effects and required a clinic visit.
- 13% of volunteer women beginning basic training drop-out of training for reasons unrelated to chlamydia infection.
- 2% attrition rate for the first year in the Army after basic training.
- 30% of women who remained in the army with uncured chlamydial infections develop PID and 40% of those would develop symptoms.
- 11% of women with symptomatic PID would require inpatient treatment.
- 16.7% of women would be discharged from the military within their first 6 months of service because of development of symptomatic PID.

The following outcomes were incorporated in the model in the sensitivity analysis involving an extension of the study time frame to two years: 18% of women with PID (symptomatic or asymptomatic) would develop CPP16 (chronic pelvic pain) and 18% would require an inpatient visit. The attrition rate in the second year would be 14%.

Measure of benefits used in the economic analysis
The number of cases of C. trachomatis infections effectively treated, and cases of asymptomatic and symptomatic PID prevented in a hypothetical cohort of 10,000 trainee over a 1 year time frame (2 years in the sensitivity analysis) were the benefit measures in the economic analysis. These were calculated using a decision analytic model with input data coming from Fort Jackson study, literature review and Fort Jackson records.

Direct costs
Costs were discounted. Some quantities were reported separately from the costs. Cost components were reported separately. The cost analysis covered the costs of the intervention programme and costs of PID cases. The variable costs of the intervention programme and cost of PID associated with C. trachomatis infection were outpatient visits and inpatient bed days. Costs of intervention consisted of the costs of the nurse or health educator to provide education and to collect, process, and ship specimens; the cost of shipping specimens; the cost of testing by a contractor-operated laboratory; the cost of follow-up, including a clinic visit for women who test positive; the cost of single-dose azithromycin (1 gram) for treatment; and the cost of a clinic visit for complaints of possible side-effects associated with antibiotic treatment. The perspective adopted in the cost analysis was that of the army (i.e., a modified payer). The source of resource use data for PID treatment was Army records in 1996. The source of unit cost data was the study institution (Fort Jackson), which was considered average within the military system. 1995 price data were used.

Indirect Costs
Costs were discounted. Some quantities were reported separately from the costs. Cost components were not reported.
separately. The indirect cost (lost productivity) analysis covered the lost training costs because of recruits who were discharged because of PID after basic training (including supplies and salaries associated with instruction, and site and service support, and housing), and because of recruited women receiving treatment for PID. Because of the complexity of detailed cost calculations, it was assumed that each day absent from training or work for a soldier was associated with an average loss of $136, based on an army source. Projected attrition rates were obtained from a US army personnel model. 1995 price data were used.

**Currency**

US dollars ($).

**Sensitivity analysis**

A set of one-way sensitivity analyses was performed on all parameter values. A multivariate sensitivity analysis was performed to extend the analytic horizon to 2 years. Threshold values were computed for some sensitive parameters of the model.

**Estimated benefits used in the economic analysis**

In a cohort of 10,000 women and with a time horizon of 1 year (the base case analysis), the no screening policy was associated with an expected 276 cases of symptomatic or asymptomatic PID from a total of 920 cases of C. trachomatis infections. Screening by age would prevent 222 cases of symptomatic or asymptomatic PID and would result in effective treatment of 740 C. trachomatis infections. The corresponding figures for the universal testing were 11 (cases over targeted screening) and 777, respectively. The universal treatment would result in effective treatment of 883 cases of C. trachomatis infections and would prevent 43 cases of PID over targeted screening and prevent 32 cases over the universal testing.

**Cost results**

The discount rate was 3%. The total cost (programme plus illness, and training lost) for a cohort of 10,000 women in the base case analysis was $220,900 for no screening, $217,600 for the targeted screening, $226,400 for the universal screening, and $221,100 for the universal treatment strategies.

**Synthesis of costs and benefits**

In the base case analysis, the targeted screening was the most cost-saving strategy with a saving of $3,300 over no screening, corresponding to a saving of $15 for each additional case of PID prevented. The incremental cost of the universal testing compared to the targeted screening was $800 per PID prevented. The corresponding value for the universal treatment over targeted screening was $81 per PID prevented. Under a 2-year analytic horizon, universal treatment was the most cost-saving strategy.

**Authors' conclusions**

Screening by age provided cost savings to the Army over a 1-year period. Other organisations accessing large cohorts of young women could also benefit, even in the short term, from implementation of an age-based chlamydial screening programme. Universal testing or universal treatment may be warranted in which long-term societal goals, such as maximum reduction of PID, are relevant.

**CRD COMMENTARY - Selection of comparators**

The reason for the choice of the comparator (a policy of no screening) is clear. This allowed the active value of the intervention to be evaluated.

**Validity of estimate of measure of effectiveness**
The internal validity of the effectiveness results cannot be reasonably guaranteed given the apparent lack of a systematic review of the literature, and quality assessment of the primary studies included in the review. The authors did not clearly report the methods used to estimate the clinical probabilities from the literature. The impact of differences in the primary studies on the estimated clinical probabilities was not discussed.

**Validity of estimate of measure of benefit**
The benefits were estimated using a decision analytic model, which appeared to be appropriate.

**Validity of estimate of costs**
Some quantities were reported separately from the costs. Adequate details of the methods of cost estimation were given. All relevant direct costs appear to have been included in the cost analysis. The price year was specified and future costs were discounted.

**Other issues**
The authors' conclusion appears to be justified given the uncertainties in the data. The issue of generalisability to other settings or countries was addressed by performing sensitivity analysis. Comparisons were made with other studies. The study sample consisted of army trainees and the authors' comment appears to reflect that. According to the authors, an analysis based on a societal perspective in combination with longer-term time horizon and inclusion of outcomes such as ectopic pregnancy and infertility would have been more appropriate, if feasible, to incorporate all potential benefits and costs associated with the intervention strategies.

**Implications of the study**
Development of a management strategy for all training programmes where tens of thousands of women annually pass through a defined and controlled point of entry should be a high priority. This initiative could be considered part of the national strategy for control of STDs and their sequelae. These training programmes with well-defined entry cohorts provide a unique opportunity to educate, diagnose, and treat for the benefit of society in general.

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