Screening for Chlamydia trachomatis infection using the BDProbeTec ET Chlamydia trachomatis amplified DNA assay on urine in a GUM clinic setting: a simple, fast and cost-effective alternative

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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
The use of the BDProbeTec ET assay, a nucleic acid amplification technique (NAAT), for the detection of Chlamydia trachomatis (C. trachomatis) infection.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients testing for C. trachomatis.

Setting
The setting was a clinical laboratory. The economic study was conducted in the UK.

Dates to which data relate
The dates to which the effectiveness and resource use data related were not reported. The price year was not given.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was not carried out on the same sample of patients as that used in the effectiveness study.

Study sample
The use of power calculations was not reported. A group of 419 consecutive new or re-booked (re-attending after 3 months) patients attending the study centre and requesting investigation for sexually transmitted infections were considered for the study. There were 210 men and 209 women. Those attending for "test of cure" or follow-up were not included. No information on the patient demographics was given.

Study design
This was a diagnostic study in which each patient was examined using the two diagnostic tests (BDProbeTec ET and
standard culture). It was unclear whether it was conducted retrospectively. However, the notes of patients with discrepant results were retrospectively reviewed. Given that none of the two tests could be considered a 'gold' standard, patients with positive results with the BDProbeTec ET assay, but negative results with the culture test, were compared with a sample of patients who had negative results with both tests. The rationale for this comparison was to determine whether patients with positive results with the BDProbeTec ET assay were likely to be false or true positives. Clinical aspects of patients negative with both tests were therefore compared with BDProbeTec ET-positive (but culture negative) patients.

The study was carried out at the Department of Genitourinary Medicine of the West Wing Hospital in Cardiff, UK. The patient management protocol consisted of eliciting a full sexual and medical history from the patients, followed by genital examination and specimen collection. The patients were not followed after the test results were obtained.

**Analysis of effectiveness**
The analysis of effectiveness was limited to those patients with positive or negative results with the BDProbeTec ET assay. Those with inhibitory or equivocal results were excluded. The outcome measures used were:

- the number of positive and negative samples by either method; and
- the sensitivity, specificity, and positive and negative predictive values (PPVs and NPVs).

All of these outcome measures were assessed assuming that patients with negative or positive results with both tests were true positives and true negatives. In addition, patients with positive results with the BDProbeTec ET assay, but negative culture results, were compared with patients with negative results with both tests (control group). The patients were compared in terms of contacts of chlamydia, clinical problems suggestive of possible chlamydial infection, and treatment for chlamydia.

**Effectiveness results**
Since 8 samples were inhibitory or equivocal with the BDProbeTec ET assay (which turned out to have been negative by culture), the final sample considered in the study included 411 samples.

The number of positive results by either method was 49 (11.9%). Of these, 26 (6.3%) were positive by both methods, 21 (5.1%) were positive only by the BDProbeTec ET assay, and 2 (0.5%) were positive by culture only.

Twenty-one samples (13 men and 8 women) were positive by the BDProbeTec ET assay, but negative by culture. These patients had specific risk factors for C. trachomatis infection and were then compared with the control group.

The sensitivity, specificity, and PPV and NPVs were calculated on the basis of the absence of false positive tests by either method. For culture, the sensitivity was 57%, the specificity 100%, the PPV 100% and the NPV 94%. For the BDProbeTec ET assay, the sensitivity was 96%, the specificity 100%, the PPV 100% and the NPV 99.4%.

The comparison with the control group showed that the 21 patients who were positive by the BDProbeTec ET assay alone were more likely than to be contacts of chlamydia than the controls (33% versus 10%). They were also more likely to have clinical problems suggestive of possible chlamydial infection and, therefore, to have been empirically treated (38% versus 13%). The proportion of BDProbeTec ET assay only positive patients who received treatment before the laboratory results were available was 71%, compared with 23% of the control group. The proportions of BDProbeTec ET assay and control patients attending the genitourinary medicine clinic for reasons not related to C. trachomatis and without symptoms suggestive of C. trachomatis were 28% and 77%, respectively.

These profiles suggested that chlamydial cultures may have produced false negative results in these patients.

**Clinical conclusions**
The effectiveness study showed that testing for C. trachomatis by the BDProbeTec ET assay was reliable, and that the assay was a superior alternative to standard culture. The analysis also revealed that urine samples from both men and
women were satisfactory for the detection of C. trachomatis.

**Measure of benefits used in the economic analysis**
The summary benefit measure used was the number of positive cases determined with each technique. This was derived directly from the effectiveness analysis.

**Direct costs**
Discounting was irrelevant due to the short timeframe of the study. The unit costs were not provided separately from the quantities of resources used. The health services included in the economic evaluation were consumables, labour and overheads. Major capital equipment was not considered. The consumables consisted of the BDProbeTec ET assay kit itself plus the machinery to run it, and the reagents and equipment involved in C. trachomatis culture. Overhead costs were calculated as a proportion of laboratory expenses. The cost/resource boundary was not reported, but it could have been that of the laboratory. Resource use was estimated on the assumption that there would be one test for each patient. The source of the costs was not reported, but the prices were presumably obtained from the laboratory. The price year was not reported.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
The indirect costs were not considered.

**Currency**
UK pounds sterling (GBP).

**Sensitivity analysis**
Sensitivity analyses were not conducted.

**Estimated benefits used in the economic analysis**
See the 'Effectiveness Results' section.

**Cost results**
The cost per patient was 3.50 with the culture test and 6.50 with the BDProbeTec ET assay. The processing time was considerably shorter with the BDProbeTec ET assay (half a working day) than with the culture test (3 working days).

**Synthesis of costs and benefits**
Average cost-effectiveness ratios were calculated to combine the costs and benefits. No incremental analysis was performed. The average cost per true positive case determined was 51.38 with the culture test and 56.84 with the BDProbeTec ET assay.

**Authors' conclusions**
The BDProbeTec ET assay was a reliable tool for the detection of Chlamydia trachomatis (C. trachomatis). Despite the higher initial cost, its cost-effectiveness was comparable with that of the standard culture test.
CRD COMMENTARY - Selection of comparators

The rationale for the choice of the comparator (culture) was appropriate as it represented a routine approach for the detection of C. trachomatis. The authors stressed that culture had been considered the 'gold' standard for nearly 40 years, but the introduction of NAATs has questioned the solidity of culture. You should decide whether it represents a valid comparator in your own setting.

Validity of estimate of measure of effectiveness

The analysis of effectiveness was mainly based on a diagnostic study (within-group comparison). This was appropriate for the study question as no external control group was required. The two diagnostic techniques were performed on each patient. It appears that the urine specimens and genital swabs were collected during the same visit, although the results were available in different timeframes. Therefore, the sequence of the tests should have had no impact on the results of the analysis. The study sample comprised consecutive patients and it is likely to have been representative of the study population. Blinding was not feasible and some interpretation bias could have affected the results of the analysis. The authors did not address the issue of the choice of an appropriate sample size. In addition, the effectiveness evidence came from a single centre. These issues tend to limit the internal validity of the analysis. Further, the characteristics of the control group were also used to assess the clinical implications of using the BDProbeTec ET assay in place of standard culture.

Validity of estimate of measure of benefit

The summary benefit measure was specific to the study intervention. It was derived directly from the effectiveness study. It would be difficult to compare this measure with the benefits of other health care interventions.

Validity of estimate of costs

The authors did not state which perspective was adopted in the study. Only the costs associated with the performance of the test were considered. Other costs, such as those related to the treatment of infection, long-term treatment of infertility due to C. infection, and other health care services, were not included. The impact of including the indirect costs was not discussed. A breakdown of the cost items was provided, but the unit costs were not reported separately from the quantities of resources used. The price year was not given, which reduces the possibility of carrying out reflation exercises in other settings. Similarly, the source of the costs was not given. Statistical tests were not conducted and the cost estimates were specific to the study setting. Overall, it appears that it would be difficult to replicate the study since few details were provided.

Other issues

The authors did not compare their findings with those from other studies, although they stated that several studies had reported on the reliability of NAATs. The issue of the generalisability of the study results to other settings was not addressed and sensitivity analyses were not conducted. Therefore, the external validity of the analysis is low. The authors highlighted the advantages (ease of performance, less invasive approach) and disadvantages (crossover and contamination of samples) of the BDProbeTec ET assay. Average cost-effectiveness ratios were calculated, but the use of an incremental analysis would have been interesting.

Implications of the study

The study results suggested that health care purchasers and providers should consider the advantages of using the BDProbeTec ET assay for the routine testing for C. trachomatis infections.

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Bibliographic details

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Other publications of related interest

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Subject indexing assigned by NLM

MeSH
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