Cost-effectiveness of alternative outpatient pelvic inflammatory disease treatment strategies
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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.

CRD summary
This study examined the cost-effectiveness of antibiotic treatment regimens for mild-to-moderate pelvic inflammatory disease (PID) focusing on differences in the drug acquisition costs. The authors concluded that the more expensive antibiotic regimens were economically reasonable even at relatively small decreases in PID complication rates. The methodology was valid, especially for the analysis of uncertainty, but the study was based on assumptions on the clinical effectiveness of the treatments, and this should be considered when evaluating the authors’ conclusions.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to examine the relative cost-effectiveness of several antibiotic treatment regimens for mild-to-moderate pelvic inflammatory disease (PID), focusing on differences in the drug acquisition costs.

Interventions
The individual antibiotics, assessed as antibiotic regimens of one, two, or three antibiotics, were ceftriaxone, doxycycline, metronidazole, cefoxitin, levofloxacin, and ofloxacin. These regimens were compared in pairs and not all together.

Location/setting
USA/out-patient.

Methods
Analytical approach:
The analysis was based on a Markov model with a hypothetical cohort of 18-year-old women. The time horizon of the model was 10 years. The authors stated that a societal perspective was adopted.

Effectiveness data:
The clinical data came from a selection of known, relevant studies, the designs of which were not reported. A key assumption of the model was that the relative risk of PID complications (chronic pelvic pain, infertility, and ectopic pregnancy) was decreased by 1% by the more expensive antibiotic regimen. This assumption was necessary due to the lack of reliable head-to-head studies comparing the efficacy and safety of the regimens. Most of the evidence on PID outcome frequency came from the Pelvic Inflammatory Disease Evaluation and Clinical Health (PEACH) trial. Other details on the sources of data or the methods used to aggregate these estimates were not given.

Monetary benefit and utility valuations:
The utility valuations were derived from a study that used Health Utility Index scores assigned by an Institute of Medicine panel.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and were discounted at an annual rate of 3%.

Cost data:
The economic analysis included the cost of the antibiotic regimens (acquisition and treatment of side effects) and management of the following PID-related events: chronic pain, ectopic pregnancy, infertility, and tubo-ovarian abscess.
The drug costs were based on average wholesale prices and PID outcome costs came from published sources. Only a few details on resource consumption were given. All costs were in US dollars ($) and were discounted at an annual rate of 3%. The price year was 2004.

Analysis of uncertainty:
A one-way sensitivity analysis was carried out on all the model inputs, using ranges of values that were generally derived from the literature. A probabilistic sensitivity analysis with 1,000 iterations was also performed, using pre-specified probabilistic distributions for the model inputs. The expected value of perfect information (EVPI) was calculated assuming 750,000 PID cases per year.

Results
The cheapest regimen (which was assumed to have a relative risk of PID complications of 1% more than the more expensive regimen) was ceftriaxone/doxycycline ($3,821). The most expensive regimen was ofloxacin/metronidazole ($3,979). Ceftriaxone/doxycycline was associated with a gain of 7.272 QALYs and ofloxacin/metronidazole with 7.278 QALYs. The incremental cost per QALY gained with ofloxacin/metronidazole was $30,165.

Comparisons of other pairs of regimens under the same assumptions showed incremental cost-utility ratios ranging from cost-saving for cefoxitin regimens over ceftriaxone regimens, to $25,500 per QALY for ceftriaxone/doxycycline over ofloxacin.

The deterministic sensitivity analysis showed that the cost and complication rate difference were the most influential model inputs. The most expensive regimens always had favourable cost-utility ratios, when they reduced the relative risk of complications by 2% or more, or if the regimen cost differences were less than $14.

The probabilistic analysis indicated that the most expensive regimen (ofloxacin/metronidazole) was the preferred option at a willingness to pay of $27,000 or higher compared with the cheapest regimen (ceftriaxone/doxycycline).

The EVPI analysis showed that further research to detect 1% or 5% differences in complications between antibiotics would be too expensive, and would not be worthwhile given the very large sample size needed, irrespective of the cost differences between antibiotics. It would be worthwhile to conduct further research to detect a 10% difference in the rate of PID complications between regimens with more than $50 cost differences.

Authors’ conclusions
The authors concluded that the use of the more expensive antibiotics was economically reasonable even at relatively small decreases in PID complication rates.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear, in that the authors considered a wide range of possible recommended regimens for the treatment of PID. The dosages were reported.

Effectiveness/benefits:
The clinical evidence came from mixed sources, which were not described in detail. No information was provided on the study design, patient population, type of treatment administered, length of follow-up, and other issues regarding the combination of data from different studies. The key assumption made to derive the comparative efficacy of treatments was not supported by any published evidence, but the scope of the study was to assess the cost-effectiveness by varying this assumption. In fact, to overcome these potential limitations, the authors undertook an extensive sensitivity analysis on the clinical inputs. The use of QALYs was appropriate as they detect the impact of disease on the patients’ health and allow cross-disease comparisons to be made.

Costs:
The authors stated that a societal perspective was adopted, but only the direct medical costs appear to have been included. The costs and their sources were not clearly described. The unit costs and resource quantities were not reported separately, with most of the costs being presented as macro-categories. Other details such as the price year and...
the use of discounting were reported.

Analysis and results:
The costs and benefits were appropriately reported and were synthesised using an incremental approach, the results of which were presented. Conventional discounting was applied to both the costs and benefits. Extensive details of the decision model were provided. The issue of uncertainty was appropriately and fully investigated, and the results were clearly reported and discussed. The authors acknowledged that it was unclear whether any real differences in the efficacy of the treatment regimens existed, and the analysis was based on assumptions, as previously stated.

Concluding remarks:
The study was based on valid methodology, especially for the analysis of uncertainty, but it was also based on assumptions on the clinical effectiveness of the treatments compared, and the authors’ conclusions should be viewed considering this issue.

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