Management of urinary tract infection in general practice: a cost-effectiveness analysis

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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
Two approaches for managing urinary tract infections (UTIs) were considered. The two approaches were empiric antibiotic treatment on presentation with symptoms, and the use of diagnostic tests (dipstick and/or laboratory test). Seven patient management strategies were subsequently generated and compared:

- no treatment;
- empiric treatment;
- empiric treatment plus laboratory test;
- dipstick and treatment;
- dipstick and treatment plus laboratory test;
- laboratory test and wait for preliminary results; and
- laboratory test and wait for sensitivities.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study target population comprised non-pregnant, adult women presenting to a general practice with symptoms of uncomplicated UTI (frequency, dysuria, urgency, nocturia). The actual population was hypothetical due to the modelling nature of the study.

Setting
The setting was primary care. The economic study was carried out in the UK.

Dates to which data relate

Source of effectiveness data
The effectiveness data were derived from a review and synthesis of completed studies, supplemented with expert
Modelling
A decision-analytic model was used to combine the costs and outcomes.

Outcomes assessed in the review
The following outcomes were assessed:

the prevalence of symptoms in the target group;
the probability of UTI given symptoms;
the specificity of laboratory culture;
the probability that symptoms resolve naturally given UTI;
the probability that antibiotics resolve symptoms given UTI;
the probability that specific antibiotics resolve symptoms given UTI;
the probability of side effects due to antibiotic treatment;
the period before antibiotics resolve symptoms;
the period before infections resolve naturally; and
the duration of side effects.

Study designs and other criteria for inclusion in the review
Not reported.

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
Five primary studies were included in the review.

Methods of combining primary studies
The data from the primary studies were not combined to generate single parameter estimates.
Results of the review
The prevalence of symptoms in the target group was 5%.
The probability of UTI given symptoms was 50%.
The specificity of laboratory culture was 100%.
The probability that symptoms resolve naturally given UTI was 50%.
The probability that antibiotics resolve symptoms given UTI was 90%.
The probability that specific antibiotics resolve symptoms given UTI was 90%.
The probability of side effects due to antibiotic treatment was 10%.
The period before antibiotics resolve symptoms was 2 days.
The period before infections resolve naturally was 3 days.
The duration of side effects was 2 days.

Methods used to derive estimates of effectiveness
The review of the primary studies was supplemented with expert opinion and some assumptions.

Estimates of effectiveness and key assumptions
The authors assumed that patients with non-UTI would not benefit from any of the treatment strategies.

Expert opinion informed the following parameter estimates:
- the sensitivity of the dipstick was 89% and the specificity was 68%;
- the sensitivity of laboratory culture was 100%;
- the number of symptom days for non-responsive UTI was 7;
- the time before the basic laboratory results were known was 2 days; and
- the time before the laboratory sensitivity results were known was 3 days.

Measure of benefits used in the economic analysis
The summary measure of health benefit used was the number of symptom-free days per episode of UTI. This was estimated via the model.

Direct costs
The costing was carried out from the perspective of the NHS. The authors did not report that discounting was carried out, although they also did not report a time horizon. Nevertheless, the period of analysis seems to have corresponded to the treatment period, which was very short. Therefore, it would appear that discounting was, appropriately, not used in the analysis. The authors focused on the variable costs of each treatment strategy since the environmental setting was identical between the treatments, therefore making the fixed costs the same for each. The costing focused on test usage,
drugs prescribed and general practice visits. The unit costs from published sources and expert opinion were reported separately. The quantities were determined by the patient’s pathway through the model. A price year was not stated.

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

**Indirect Costs**
The indirect costs were not included as the analysis was carried out from the perspective of the NHS.

**Currency**
UK pounds sterling (€).

**Sensitivity analysis**
A one-way sensitivity analysis was conducted on all parameter values to assess the robustness of the model. The authors did not report how the ranges for the sensitivity analysis were selected.

**Estimated benefits used in the economic analysis**
Empiric treatment provided 2.15 symptom-free days per episode.

Empiric treatment and laboratory culture provided 2.19 symptom-free days per episode.

The remaining patient management strategies provided fewer symptom-free days at a greater cost. Therefore, the results were not reported.

**Cost results**
Empiric treatment cost 13.90 per episode.

Empiric treatment and laboratory culture cost 22.50 per episode.

The remaining patient management strategies cost more for fewer symptom-free days. Therefore, the results were not reported.

**Synthesis of costs and benefits**
Compared with empiric treatment alone, empiric treatment and laboratory culture cost an extra 215 per additional symptom day averted.

The sensitivity analyses revealed that the no treatment strategy and strategies involving laboratory tests were always more costly and less effective than the empiric strategy.

When the duration and probability of side effects from antibiotics were high, the dipstick and dipstick plus laboratory strategies became potentially cost-effective.

**Authors’ conclusions**
Empiric treatment was the most cost-effective strategy, remaining the least costly when all parameters were varied individually.

**CRD COMMENTARY - Selection of comparators**
The authors compared seven patient management strategies and justified their choice by discussion with clinicians. The seven alternatives seem to have covered the main forms of diagnosis and treatment available at the time of the study.

Validity of estimate of measure of effectiveness
The authors did not report that a systematic review of the literature had been undertaken. As the analysis was carried out via modelling, parameter estimates relevant to the decision model were sought from the literature. Estimates of effectiveness from primary studies were not combined to form a single parameter estimate. The authors did not discuss, or consider, the impact on the effectiveness estimates of differences between the primary studies. However, extensive sensitivity analyses were carried out and these help the reader to understand the potential implications of differences in parameter values. The review would have been significantly improved by a broader discussion of how the primary literature was sourced, and why particular studies were chosen to provide specific estimates. For instance, the papers reported may have been the only studies to provide information relevant to the current study.

Validity of estimate of measure of benefit
The number of symptom-free days per episode of UTI was used as the summary measure of health benefit. This was estimated in the effectiveness study via the decision model. This measure was appropriate in that it showed the benefits of the technologies of interest. However, it does not allow comparison of the cost per outcome with unrelated technologies.

Validity of estimate of costs
The costing was carried out from the perspective of the NHS. As such, costs relevant to this perspective were included in the analysis. The authors explicitly stated that fixed costs relevant to treatment were excluded because the common environmental setting for all technologies ensured that these costs were equal for each treatment strategy. This approach enables the reader to focus closely on the differences in the cost of the technologies. However, the reader must be sure not to generalise the results to estimate budgetary impact, as the exclusion of the fixed costs would make this estimate inaccurate. The unit costs were reported separately and the quantities were determined within the decision model.

Other issues
The authors did not compare their results with findings from other studies. This may have been due to the stated lack of published information. The issue of generalisability of the results was not explicitly discussed, although the nature of the model and the extensive sensitivity analyses suggest that the results may apply to similar settings, and the model could easily be adapted to account for small differences in treatment practice. The authors presented their results selectively in the sense that, owing to the large number of treatment strategies and the fact that some technologies were dominated, they did not report costs and health benefits for each strategy. The readers’ understanding of the results, and their ability to transfer them to their own setting could have been improved had a brief summary of the total health benefits and total costs associated with each strategy been provided. The conclusions drawn accurately reflected both the scope of the analysis and the results presented.

Several limitations were presented. These centred on the assumptions that were made. For example, assuming no benefit for patients whose symptoms are caused by something other than UTI. The authors explained that this assumption made the results more conservative. A further limitation was not incorporating the long-term impact of empiric therapy on antibiotic resistance. The authors provided a very useful discussion on this aspect and reported some ways to overcome this problem in future.

Implications of the study
The authors did not make any recommendations for policy or practice following their results. They did, however, suggest further work in refining the model as strategies develop and additional information becomes available. In particular, the authors suggested investigating the impact of antibiotic resistance.
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None stated.

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Other publications of related interest

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