Pharmacoeconomic analysis of guidelines for treating mild diabetic foot infections: a decision-tree model for Canada

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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
The objective was to assess the cost-effectiveness of various treatments, recommended by the Infectious Diseases Society of America, for mild diabetic foot infections. The authors concluded that clindamycin was the most cost-effective treatment, but they urged caution in interpreting this result due to the relatively small sample size of some of the trials that provided the effectiveness data. This conclusion appears to be appropriate.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to assess the cost-effectiveness of various treatments, recommended by the Infectious Diseases Society of America (IDSA), for mild diabetic foot infections.

Interventions
Five oral antibiotics, with three parenteral antibiotics, were examined. The oral antibiotics were amoxicillin-clavulanate, cephalaxin, clindamycin, cloxacillin, and levofloxacin. For patients for whom these oral antibiotics were not successful, the parenteral antibiotics were imipenem, piperacillin-tazobactam, and ticarcillin-clavulanate.

Location/setting
Canada/primary and secondary care.

Methods
Analytical approach:
A decision-tree model was developed to evaluate the outcomes and costs associated with each treatment. The time horizon of the analysis was 24 days. The authors stated that the perspective of the Ontario Ministry of Health and Long-Term Care was adopted.

Effectiveness data:
The effectiveness data were derived from a systematic review of the literature. MEDLINE, EMBASE, and the Cochrane Library were searched for randomised controlled trials using the terms "diabetes or diabetic" and "foot or lower limbs" and "ulcer or infection or cellulitis". Three Canadian infectious disease experts were also consulted. The main clinical parameters were the clinical success rates (resolution of infection) associated with each treatment.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The measure of benefit was the success rate of each treatment.

Cost data:
The cost categories included medications, amputation, and hospitalisation. The resource use data were obtained from published studies. Drug costs were obtained from the Ontario Drug Benefit Formulary/Comparative Drug Index; amputation costs were obtained from the Canadian Institute for Health Information database; and hospital costs were
obtained from a health science centre. The price year was 2007 and all costs were reported in Canadian dollars (CAD).

Analysis of uncertainty:
Both deterministic and probabilistic sensitivity analyses were performed on the key parameters.

Results
Success rates were 99.4% for clindamycin, 97.8% for cephalexin, 95.4% for amoxicillin-clavulanate, 95.2% for cloxacillin, and 95.0% for levofloxacin. The total costs were CAD 361.33 for clindamycin, CAD 1,239.99 for cephalexin, CAD 2,580.81 for amoxicillin-clavulanate, CAD 2,658.88 for cloxacillin, and CAD 2,823.25 for levofloxacin. Clindamycin therefore dominated all other alternatives as it was more effective and less costly.

The sensitivity analyses showed that these results were robust to changes in costs, but sensitive to changes in success rates. For example, if clindamycin had a success rate of less than 87%, cephalexin was the dominant treatment.

Authors’ conclusions
The authors concluded that clindamycin was the most cost-effective treatment for mild diabetic infection, but urged caution regarding the results as they were based on evidence from relatively few trials with small sample sizes.

CRD commentary
Interventions:
The interventions were well reported, including details of dosage and duration. They were recommended by the IDSA, and were likely to be the relevant strategies in the authors’ setting.

Effectiveness/benefits:
The systematic review of the literature should have ensured that the most up-to-date and relevant data were used to populate the model. The use of randomised controlled trials, given the strengths of their design, should have ensured a high degree of internal validity for the chosen trials. The effectiveness data were well reported. A limitation, which was acknowledged by the authors, was the small number of trials found and their relatively small sample sizes. This was partly overcome by the authors’ use of extensive sensitivity analyses around the effectiveness estimates. The outcome was the success rate of each treatment in resolving infection, which appears to have been the most relevant clinical outcome.

Costs:
The costs reflected the perspective stated. The unit costs and their sources were reported and appear to have been appropriate. The level of reporting made the cost analysis extremely transparent allowing the reader to ascertain fully which resource use and cost data were included.

Analysis and results:
A synthesis of the costs and benefits was appropriately performed and the full results were presented. Uncertainty in the model parameters was addressed through an extensive sensitivity analysis. The authors discussed a number of potential limitations to their analysis, the most important of which was the small sample size of some of the trials from which the effectiveness estimates were drawn.

Concluding remarks:
Overall, the methodology was clearly presented and valid, but the analysis was limited by the small sample size of some of the trials that provided the effectiveness estimates. This limitation was reflected in the authors’ conclusions which appear to be appropriate.

Funding
Not stated.

Bibliographic details
Chow I, Lemos EV, Marr P, Machado M, Einarson TR. Pharmacoeconomic analysis of guidelines for treating mild

Original Paper URL
http://journals.sfu.ca/cshp/index.php/cjhp/article/view/97

Indexing Status
Subject indexing assigned by CRD

MeSH
Anti-Bacterial Agents; Canada; Cilastatin; Cost-Benefit Analysis; Decision Trees; Diabetes Complications; Diabetic Foot; Economics, Pharmaceutical; Humans

AccessionNumber
22009100535

Date bibliographic record published
07/04/2009

Date abstract record published
27/01/2010