Foot infections in diabetic patients: decision and cost-effectiveness analyses

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 treatment of patients with type II diabetes with foot infections and suspected osteomyelitis using a combination of antibiotic therapy, diagnostic tests and amputation.

Type of intervention
Diagnosis; treatment.

Economic study type
Cost-utility analysis.

Study population
Hypothetical cohort of 56 year old patients with typeII (non-insulin dependent) diabetes mellitus for 7 years (NIDDM) who have foot infections and suspected osteomyelitis.

Setting
Primary care and hospital. The economic study was carried out in the USA.

Dates to which data relate
Dates for effectiveness and resource data were not clearly specified. 1993 prices were used.

Source of effectiveness data
Data were drawn from the English-language literature

Modelling
Decision analysis was performed using a Markov model to estimate final outcomes and costs.

Outcomes assessed in the review
Main probabilities used in the analysis included success of short course and long course antibiotics, recurrence given success of antibiotics treatments, surgical death and failure to heal.

Study designs and other criteria for inclusion in the review
English-language literature was included.

Sources searched to identify primary studies
Medline database searches and bibliographies from selected articles.

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

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

Number of primary studies included
Not stated.

Methods of combining primary studies
This was not specified, but it seems that for each main outcome, the mean values were considered.

Investigation of differences between primary studies
Not stated.

Results of the review
Apparent success of a short course of antibiotics ranged from 0.50 - 0.85, while that of a long-course antibiotics ranged from 0.31 - 1. There was recurrence in case of short-course antibiotics in patients with osteomyelitis. Depending on the site of amputation, surgical death and failure to heal probabilities ranged from 0.001 - 0.05 and 0.16 - 0.30 respectively.

Measure of benefits used in the economic analysis
Quality-adjusted life expectancy based on the judgements of experienced physicians. A Markov model was used to derive final outcomes. Part of the analysis discounted benefits at 5%.

Direct costs
Costs and quantities were not reported separately, and were combined in the modelling exercise. Costs included inpatient hospital costs, physician costs, the costs of tests and the ambulatory costs following hospitalization. Average total inpatient hospital costs for seven Boston teaching hospitals were obtained from Medicare Cost Reports tapes, and inpatient physician costs were estimated based on 50th-percentile nationwide reference fees. The costs of radiologic testing were obtained from the New England Medical Centre's cost accounting system and included staff costs. Ambulatory costs were obtained from Tufts Associated Health Plans Inc. Part of the analysis discounted costs at 5% per year. 1993 prices were used.

Currency
US dollars ($)

Sensitivity analysis
The authors conducted a number of one-way and two-way simple sensitivity analyses. In particular, they allowed the following factors to vary: prevalence of osteomyelitis; variability of antibiotic regimens; quality of life while receiving medical therapy; probability of apparent cure and relative efficacy of re-treatment; location of foot infection; cost of magnetic resonance imaging; cost of hospitalization for lower-extremity amputation; and physical function-adjusted life expectancy.
Estimated benefits used in the economic analysis
In the baseline case, quality-adjusted life expectancy varied only marginally according to the treatment strategy used and ranged from 13.18 - 13.19 years (8.93 discounted at 5%) for strategies which used a long course of antibiotics liberally to 12.97 years (8.68 discounted at 5%) for strategies which used amputation liberally.

Cost results
A long course of antibiotics following initial hospitalization cost $30,880 and immediate amputation cost $46,900. Performing non invasive tests to select patients for long-term antibiotic therapy cost from $31,000 to $33,750. Invasive tests, i.e. bone biopsy, cost $800.

Synthesis of costs and benefits
The marginal cost-effectiveness ratios were not reported directly, since quality-adjusted life expectancy was similar for all cases. The authors concentrated on the additional costs of each treatment strategy. The cost-effectiveness of medical testing was very sensitive to changes in the cost of magnetic resonance imaging. At the base-line prevalence of osteomyelitis of 42%, the probability of successful treatment with antibiotics must drop below 0.13 for testing followed by amputation in patients with positive magnetic resonance images to be better than long-course antibiotic treatment.

Authors' conclusions
Noninvasive tests and bone biopsy affords no advantage over empiric treatment with a long course of a culture-guided antibiotic regimen.

CRD Commentary
This appears a well conducted study, but more information is needed on the cost break down. Moreover, the literature review about effectiveness could have been conducted in a more rigorous way.

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