Modelling the cost-effectiveness of biologic treatments for psoriatic arthritis
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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 determine the cost-effectiveness of etanercept, infliximab, and adalimumab, compared with palliative care, for active and progressive psoriatic arthritis in patients with mild-to-moderate disease that had inadequately responded to standard treatment. The authors concluded that etanercept appeared to be most cost-effective, but further investigation was required for a number of key model parameters. The methods appear to have been valid, and they and the results were clearly reported. The authors' conclusions seem appropriate.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to determine the cost-effectiveness of three biologic drugs (etanercept, infliximab, and adalimumab), compared with palliative care, for active and progressive psoriatic arthritis, in patients with mild-to-moderate skin disease that had inadequately responded to standard treatment, including disease-modifying antirheumatic drugs.

Interventions
Palliative care, which did not include biologic therapy, was compared with adalimumab, etanercept, or infliximab.

Location/setting
UK/secondary care.

Methods
Analytical approach:
The analysis used an updated version of a published probabilistic cohort model. A lifetime horizon was considered and the authors reported that the perspective of the UK NHS was adopted.

Effectiveness data:
A systematic review and evidence synthesis were undertaken for this study and were published separately. The effectiveness data were from a variety of sources including published studies, expert opinion, and manufacturers' estimates. For example, the rate of withdrawal from biologics was estimated from a meta-analysis, and disease progression measured by the Health Assessment Questionnaire (HAQ) for those on palliative care was from the Norfolk Arthritis Register. The main measure of effectiveness was the probability of response measured using the Psoriatic Arthritis Response Criteria (PsARC).

Monetary benefit and utility valuations:
The utility values were based on data from one of the manufacturers, who carried out linear regression on the European Quality of life (EQ-5D) utility scores versus HAQ and Psoriasis Area Severity Index (PASI) scores, from participants in randomised controlled trials.

Measure of benefit:
Quality-adjusted life-years were the summary measure of benefit and they were discounted at an annual rate of 3.5%.

Cost data:
The economic analysis included pharmaceutical costs (drugs, administration, and monitoring) and the costs of treatments for arthritis and psoriasis. Pharmaceutical costs were from the British National Formulary, and arthritis and
psoriasis treatment costs were from published studies. The costs were reported in UK pounds sterling (£). The price year was 2008 to 2009 and the costs were discounted at an annual rate of 3.5%.

Analysis of uncertainty:
Monte Carlo simulation was used to examine the uncertainty in the model outputs. The results were given as probabilities that each intervention was most cost-effective, at defined thresholds. One-way sensitivity analyses were carried out.

Results
The expected lifetime costs were £42,205 for palliative care, £66,408 for adalimumab, £72,178 for etanercept, and £89,107 for infliximab. The projected QALYs were 5.241 for palliative care, 6.642 for adalimumab, 7.115 for etanercept, and 7.430 for infliximab.

Adalimumab was extendedly dominated, as its incremental cost-effectiveness ratio (ICER) was higher than that of the next more effective option (etanercept). The ICER for etanercept, compared with palliative care, was £15,986. The ICER for infliximab, compared with etanercept, was £53,750.

At a willingness-to-pay (WTP) threshold of £20,000 per QALY, the probability that etanercept was cost-effective was 0.524. At a threshold of £30,000 per QALY, this increased to 0.566. The results were sensitive to a number of parameters including the length of the effect for biologic treatments, and the prescription costs.

Authors’ conclusions
The authors concluded that etanercept appeared to be the most cost-effective treatment for active and progressive psoriatic arthritis. Further investigation was required to reduce the uncertainty around a number of key model parameters.

CRD commentary
Interventions:
The interventions appear to have been appropriate comparators and to have included the usual practice in the authors’ setting. These comparators might be suitable for other settings.

Effectiveness/benefits:
A systematic review and a Bayesian mixed-treatment comparison were conducted for the effectiveness data, which should have included all the best available evidence. Very little information was reported on this systematic review and evidence synthesis, and the other publication should be consulted to fully assess their quality. Most of the effectiveness data were from randomised controlled trials, which should have high validity. QALYs were an appropriate benefit measure, capturing the impact of the interventions on quality of life and survival. The details of the derivation of the utility values would have been useful to fully assess their validity.

Costs:
The perspective was clearly stated and those costs relevant to this perspective appear to have been included. The sources for the cost data were clearly reported and appear to have been appropriate for the setting. Most of the costs were presented as category totals, rather than individual items, which reduces the transparency of the analysis. The costs were appropriately discounted and adjusted for inflation.

Analysis and results:
The costs and outcomes were synthesised in a probabilistic model, which was described and a diagram was given. The results were clearly reported. The impact of uncertainty in the inputs on the results was explored in probabilistic and one-way sensitivity analyses. The authors identified and discussed a number of limitations to their analysis, and these generally related to the lack of appropriate data.

Concluding remarks:
The methods appear to have been valid, and they and the results were clearly reported. The authors’ conclusions seem appropriate.
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