A cost utility model of interferon beta-1b in the treatment of relapsing-remitting multiple sclerosis

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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
Betaferon (interferon beta-1b) was compared with standard care in the treatment of relapsing-remitting multiple sclerosis (RRMS).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population was a hypothetical cohort of people with RRMS at Kurtzke Expanded Disability Scale (EDSS) Level 3.

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

Dates to which data relate
The effectiveness data were taken from a clinical study published in 1993 with a 5-year follow up published in 1995. The costs were obtained from a number of studies dating from 1996 to 2000.

Source of effectiveness data
The effectiveness data were obtained from a single study.

Link between effectiveness and cost data
The cost data were derived from a different population to that used for the effectiveness data.

Study sample
Full details of the study sample were not reported, although another paper was referenced (The IFNB Multiple Sclerosis Study Group 1993, see ‘Other Publications of Related Interest’ for bibliographic details). The total sample size reported was 372. Of these, 123 were in the control group, 125 in the 1.6 MIU-dose group and 124 in the 8 MIU-dose group.

Study design
Full details of the study design were not reported, although another paper was referenced (The IFNB Multiple Sclerosis
Study Group 1993, see ‘Other Publications of Related Interest’ for bibliographic details). The information reported in this paper indicates that the study was a multi-centred, double-blind randomised trial.

**Analysis of effectiveness**
The primary end points were annual relapse rate and the proportion of patients remaining relapse free. The secondary end points included time to first relapse, the duration and severity of relapse, and the change in EDSS scores from baseline.

**Effectiveness results**
There was a 34% decrease in relapse rates for the high-dose group compared with the placebo group.

The number of patients remaining relapse free was 18 in the placebo group, 23 in the 1.6 MIU group and 36 in the 8 MIU group. (placebo versus 8 MIU, p=0.007).

The median interval to first relapse was 295 days in the 8 MIU group versus 153 days in the placebo group, (p=0.015).

The rate of moderate and severe relapses was halved in patients receiving 8 MIU compared with placebo, (p=0.002).

**Clinical conclusions**
The authors did not report any clinical conclusions. However, the high-dose group had statistically more patients remaining relapse free than the placebo group, and showed a significantly longer time to first relapse.

**Modelling**
The authors used a decision tree model to estimate the costs and quality-adjusted life-years (QALYs) in the treatment of RRMS.

**Measure of benefits used in the economic analysis**
QALYs were used as the measure of benefit. These were calculated by multiplying each year lived in a given state by a quality of life score for that state. The weights were based on a review of published literature.

**Direct costs**
The costs were discounted using the UK government recommended rate of 6%. The direct costs were taken from a published survey of patients with RRMS in Newcastle (Parkin et al. 1998, see ‘Other Publications of Related Interest’ for bibliographic details); this was published in 1998 but the costs used were from 1996. The costs included in the survey were for inpatients and day cases, drugs, appliances and community services, and procedures and tests.

**Statistical analysis of costs**
No statistical tests were undertaken.

**Indirect Costs**
The costs were discounted using the UK government recommended rate of 6%. Societal costs were taken from a published study (Kobelt et al., see ‘Other Publications of Related Interest’ for bibliographic details). These included investment and adaptation costs (e.g. house alterations), the cost of residential care, and annual production losses due to sickness absence. The price year was 1999.

**Currency**
Sensitivity analysis
Two-way sensitivity analyses were undertaken. Under the worst-case scenario, the speed of progression was reduced by 30% and the length of mild relapses was identical in both groups. Under the best-case scenario, there was a reduction of 66% in the speed of progression and the length of mild and moderate/severe relapses was 55 days in the treated group and 28 days in the standard group.

Estimated benefits used in the economic analysis
The 20-year base-case in the control group gave 5.71 QALYs.

The 20-year base-case in the intervention group gave 10.8 QALYs.

The 10-year base-case in the control group gave 4.43 QALYs.

The 10-year base-case in the standard group gave 6.19 QALYs.

Cost results
In the 20-year base-case, the total direct costs were 93,429 in the control group and 163,084 in the intervention group. The total direct and indirect costs were 203,113 in the control group and 244,294 in the intervention group, while the total direct, indirect and informal costs were 265,773 (control group) and 281,100 (intervention group), respectively.

In the 10-year base-case, the total direct costs were 45,886 in the control group and 99,484 in the intervention group. The total direct and indirect costs were 106,556 in the control group and 146,516 in the intervention group, while the total direct, indirect and informal costs were 135,427 (control group) and 161,067 (intervention group), respectively.

Synthesis of costs and benefits
The costs and benefits were combined to give a cost per QALY.

In the 20-year base-case, the direct cost per QALY was 13,700, the direct and indirect cost per QALY was 8,100, and the direct, indirect and informal cost per QALY was 3,000.

In the 10-year base-case, the direct cost per QALY was 30,500, the direct and indirect cost per QALY was 22,800, and the direct, indirect and informal cost per QALY was 14,600.

Authors’ conclusions
The long-term gains and costs of treatment with Betaferon suggest a relatively low cost per quality-adjusted life-year (QALY), and may even generate cost-savings in some cases when a societal perspective is considered.

CRD COMMENTARY - Selection of comparators
The rationale for the comparators was clear. Until the advent of beta-interferons, the main therapy for multiple sclerosis had been symptomatic treatment. These comparators had been modelled before, but increased data availability enabled longer term modelling and the modification or replacement of the assumptions used.

Validity of estimate of measure of effectiveness
The effectiveness data were taken from a clinical study. The design of the trial was not completely reported in the paper, the original paper being referenced instead. The results were not reported in full, although it appears that all the results relevant to the model used have been presented in the paper. The authors carried out sensitivity analyses on several parameters to explore the impact of uncertainty in parameter values.
Validity of estimate of measure of benefit
The economic benefit was measured by QALYs, which were estimated using a decision model. The model considered the health states that the patients could enter and the probability of moving between these states. The utility weights were taken from published literature.

Validity of estimate of costs
The authors presented results from both a societal perspective and that of the health service. The source of the cost data was appropriately reported, although full details of the costs used in the model do not appear to have been reported. The price year was reported, which would assist any future reflation exercises.

Other issues
The authors made appropriate comparisons with other studies. They also acknowledged the limitations of the study. For example, although the evidence suggested that carers and family are heavily affected by the disease, the costs associated with this were not included. However, had these costs been included, the cost per QALY would have been reduced further. Sensitivity analyses were conducted, which further increases the external validity of the analysis.

Implications of the study
The authors made no explicit recommendations for changes in policy, or for future research.

Source of funding
None stated.

Bibliographic details

Other publications of related interest


Indexing Status
Subject indexing assigned by CRD
MeSH
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