Cost-Utility of Interferon Beta-1b in the Treatment of Patients with a Clinically Isolated Syndrome Suggestive of Multiple Sclerosis


5. Kappos L, et al. Treatment with interferon beta-1b delays conversion to clinically definite and McDonald MS in patients with clinically isolated syndromes.

Background

Multiple Sclerosis (MS) is a chronic central nervous system disorder characterized by inflammatory demyelination that tends to progress over time. In the majority of patients, MS is associated with advanced physical disability and cognitive impairment.

Methods

- To estimate the cost-utility of IFNB-1b in the treatment of patients with an initial demyelinating event suggestive of MS from an Australian societal perspective.

Approach

- We developed a Markov model of the epidemiology and treatment of CIS and MS combining the best available data from the literature and the BENEFIT clinical trial.
- A hypothetical cohort of 1,000 patients with incident CIS was specified, with health states defined by Kurtzke’s Expanded Disability Status Scale (EDSS) (Figure 1).
- The cohort was alternatively treated with IFNB-1b (250mg every other day) following an initial demyelinating event suggestive of MS or not treated until confirmation of CDMS.
- The model defined onset of CDMS according to the MS diagnostic criteria developed by Poser and colleagues.
- As not all patients with a CIS will transition to CDMS, a fraction of patients equal to the percentage of subjects in BENEFIT who evinced little or no disease progression at the end of the randomized phase of the trial (24 months) were removed from the model population at the end of the fifth year of the simulation.

Data Sources

- Analyses of clinical data from BENEFIT were used to estimate the distribution of patients at baseline by EDSS category, probabilities of transition between EDSS health states, and probability of transitioning from CIS to CDMS.
- In the absence of long-term data from BENEFIT, probabilities of transitioning from CIS to CDMS were estimated through extrapolation of trial data, while probabilities of transition between EDSS categories and of relapse post-onset of MS, were estimated from published literature.

Assumptions, discount rate and sensitivity analyses

- Following transition to CDMS, patients were assumed to be treated with IFNB-1b until they achieve EDSS 6.5, the EDSS score at which IFNB-1b therapy is no longer reimbursed by Australian health authorities.
- The model was constructed from an intention-to-treat perspective, assuming no discontinuation of treatment (with the exception of those described earlier who do not evince disease progression).
- Percent reduction in EDSS progression and relapse probability attributable to IFNB-1b treatment was assumed to be the same in CIS (after end of trial) and CDMS.
- IFNB-1b patients were assumed to have one adverse event per year, defined as an event requiring one unscheduled physician visit.
- Costs (2007 AUD) and QALY’s were discounted at 5% per annum.
- Sensitivity analyses were performed on key model parameters.

Results

- Early initiation of IFNB-1b (i.e., immediately after a CIS) and its continuous use for the treatment of CDMS yielded slower EDSS progression and reduced relapse burden compared with delayed initiation (i.e., after onset of CDMS) of IFNB-1b.
- Early treatment with IFNB-1b after a demyelinating event suggestive of MS yielded more QALY’s (270 years) over time as compared to initiation of treatment after onset of CDMS.
- In the base case (Australian societal perspective; 25-year simulation; Poser-defined MS), incremental cost-utility of early versus delayed IFNB-1b treatment was AUD 68,000 (USD 9200) per QALY gained (Figures 3, 4).
- Findings were sensitive to years simulated, IFNB-1b cost and efficacy, inclusion/exclusion of indirect costs, discount rates, health state utilities and underlying rate of disease progression (Table 3).

Conclusions

- Model results suggest that early intervention with IFNB-1b after a CIS (vs. delayed until onset of CDMS) is a cost-effective option relative to many other well-accepted healthcare interventions. As the adoption of newer MS diagnostic criteria take hold (e.g., the more recent criteria developed by McDonald and colleagues), caution needs to be exercised in assessing the value of early intervention after a CIS vs. intervention after McDonald-defined MS.

References


Figures 1 - 4: Additional figures showing model population, transition matrix, and cost-effectiveness analysis.