Introduction

- Multiple sclerosis (MS) is a prevalent chronic neurological disease with a heterogeneous clinical course.1,2
- Most patients are diagnosed with relapsing forms of MS (RMS), which are characterized by the occurrence of clinical attacks (relapses in which neurological signs and symptoms evolve over days before resolving spontaneously). Over time, disability accumulates.2,3
- Severity of disability in MS is commonly measured by the Expanded Disability Status Scale (EDSS), which ranges from 0 (no disability) to 10 (death due to MS; Figure 1).4

PRISMS study

- PRISMS (Prevention of Relapses and Disability by Interferon beta-1a Subcutaneously in Multiple Sclerosis) was a double-blind, randomized, placebo-controlled trial of interferon beta-1a (IFN-β-1a) administered subcutaneously (SC) three times weekly (tiw) for the treatment of RMS.4
- The trial included 560 patients between 18 and 50 years of age with MS, a history of two or more relapses in the previous 2 years, and an EDSS score of 0–5.0.
- The diagnosis of clinically definite or laboratory-supported definite MS was based on Poser criteria.4
- Patients were randomly assigned to IFN-β-1a SC tiw at a dose of 44 or 22 mcg or placebo for 2 years (Figure 2).

Relapse was defined as a new or worsening symptom attributable to MS with approximate new neurological abnormality or focal neurological dysfunction lasting >24 hours without fever, preceded by >30 days stability or improvement.

As reported in the primary publication,4 IFN-β-1a 44 mcg SC tiw reduced relapses over 2 years in the predefined primary analysis (mean number of relapses over 2 years for IFN-β-1a 44 mcg SC tiw was 1.73, vs 2.56 for placebo; 32% reduction; p<0.001; Figure 3A).
- A predefined subgroup analysis of the PRISMS trial included a subgroup analysis of patients with baseline EDSS >3.5–5.0. This was to evaluate treatment in patients who are significantly disabled rather than functionally impaired and who are in transition from the relapsing–remitting to the secondary progressive form of the disease. In this subgroup, the mean number of relapses over 2 years was 1.22 for IFN-β-1a 44 mcg SC tiw and 3.07 for placebo (80% reduction; p<0.002; Figure 3B).

Objectives

- To evaluate the cost-effectiveness of IFN-β-1a 44 mcg SC tiw in patients with MS with EDSS scores >3.5–5.0 in the treatment of RMS, from a US healthcare payer perspective.

Methods

Decision analytic model

A decision analytic model was constructed using a 2-year time horizon.
- The model was populated with prevalence and treatment data from IMS LifeLink Plus.
- DMD efficacy data were derived from Level 1 evidence obtained from the PRISMS study.
- The 44 mcg tiw dose regimen of IFN-β-1a was used in the model, as this is the most commonly prescribed dosage.
- The model assumed a linear relationship between adherence and efficacy.
- One-way sensitivity analyses were conducted on key parameters using alternate plausible values, including the rates of real-world DMD adherence.

Key input parameters

- Cost inputs are listed in Table 1.
- Adherence was assumed to be 100%.
- The model incorporated a standardized/weighted average relapse rate of 2.15 over 2 years for untreated placebo patients. Applying efficacy results from the PRISMS study yielded 2-year relapse rates for IFN-β-1a 44 mcg SC tiw of 0.86 and 1.45 among high-EDSS patients and the overall population, respectively.

Results

- Baseline characteristics are shown in Table 2.
- Model results showed that the mean number of relapses avoided with IFN-β-1a 44 mcg SC tiw in patients with EDSS >3.5–5.0 was 1.21 per patient over 2 years (Table 3). This was the mean number of relapses avoided for the overall population over 0.74 per patient over 2 years.

- The average cost-effectiveness of IFN-β-1a 44 mcg SC tiw was estimated to be $108,227 per relapse avoided for the EDSS >3.5–5.0 cohort (Table 3).
- The average cost-effectiveness for the overall population was estimated to be $181,208 per relapse avoided.

Conclusions

- Sensitivity analyses showed that results were robust to changes in key input parameters.
  - Varying the DMD costs by +/- 10% yielded cost-effectiveness in the high-EDSS cohort of $118,090 and $107,031, respectively.
  - Varying adherence by –10% to 90% yielded cost-effectiveness in the high-EDSS cohort of $108,878.
  - Varying the average cost per relapse by +/- 10% yielded cost-effectiveness in the high-EDSS cohort of $108,227 and $107,494, respectively.

References


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Disclosures

ALP and JL are employees of EMD Serono, Inc.* NCE is a health economic and outcomes research consultant.

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