A budget impact analysis of the Cochrane Collaboration review of first-line treatments for relapsing–remitting multiple sclerosis

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Introduction

Multiple sclerosis (MS) is an inflammatory disease of the central nervous system (CNS) and is among the most common causes of neurological disability in young people, with an annual incidence ranging from 2 to 10 cases per 100,000 persons per year.1

MS has a chronic course evolving over 30 to 40 years where development of disease progression is responsible for permanent long-term disability. About 85% of relapsing-remitting multiple sclerosis (RRMS) patients experience some form of severe disability after 20 to 25 years.1

The primary goals of current treatments for MS are to prevent lesion formation in the CNS, to decrease the rate and severity of relapses, and to delay the resulting disability.2 Progression of MS can be slowed by early treatment with disease-modifying drugs (DMDs).3

In particular, there is compelling evidence to support the use of high-dose, high-frequency interferon (IFN) beta-1a, administered subcutaneously, which has been shown to provide an effective treatment option for RRMs.4

Recently, the Cochrane Collaboration published results of a network meta-analysis that evaluated the relative effectiveness of DMDs in terms of their ability to prevent new attacks or delay disability.5

Objective

The purpose of this study was to quantify the number and cost of relapses avoided over 2 years in the first-line treatment of RRMS based on the findings of the Cochrane Collaboration network meta-analysis.

Methods

Model structure and assumptions

A cohort-based budget impact model was developed with a time horizon of 2 years.

The analysis was conducted from a US payer perspective, and direct medical costs of relapse were included.

The model evaluated the consequences of treatment with subcutaneous (SC) IFN beta-1a versus intramuscular (IM) IFN beta-1a, as this was the only comparison where data quality was assessed as "high" by the Cochrane Collaboration.

The other DMDs with a first-line indication for the treatment of RRMS – glatiramer acetate and IFN beta-1b – were excluded from the analysis as the data quality was assessed as "low" by the Cochrane Collaboration.

A hypothetical cohort of 1000 naïve RRMS patients entered the model and were treated with DMD therapy for the entire model timeline.

Since in the US the acquisition costs of first-line injectable DMDs are fairly similar, the budget impact analysis focused on quantifying the cost associated with treating the same cohort with IM IFN beta-1a.

Patients were assumed to be treated continuously with therapy for 2 years. No therapy escalation or switching was permitted within the 2-year time horizon of the model.

The model does not evaluate the relative efficacy of the newer oral agents for RRMS, as these agents were not included within the scope of the Cochrane review.

Risk of relapse inputs

The risk of relapse values were derived from the network meta-analysis odds ratios from the Cochrane Collaboration network meta-analysis (Table 1).

Results

Number of relapses avoided

In a hypothetical cohort of 1000 RRMS patients, treatment with SC IFN beta-1a is expected to result in the avoidance of 173 (sensitivity analysis range: –20 to 399) relapses versus IM IFN beta-1a over 2 years (Figure 1, Table 2).

Cost of relapses avoided

Assuming a direct cost of relapse of $1,414, treatment with SC IFN beta-1a is expected to result in a savings of $890,212 (sensitivity analysis range: -$102,138 to $2,052,934) versus IM IFN beta-1a (Figure 2, Table 3).

Conclusions

This model demonstrated that, when considering the risk of relapse at 2 years, treating a cohort of naïve patients with SC IFN beta-1a resulted in fewer relapses and greater reduction in direct medical costs than treating the same cohort with IM IFN beta-1a.

Limitations of this analysis include the following:

• The model does not distinguish between severities of relapses.

• The model does not account for potential differences in medication adherence or persistence and assumes perfect medication adherence and persistence.

• The model does not account for patients who may experience more than one relapse over the 2-year horizon, therefore potentially underestimating the cost differences in relapses avoided.

• The model does not evaluate the relative efficacy of the newer oral agents for RRMS, as these agents were not included within the scope of the Cochrane review.

References

5. ISPOR 19th Annual International Meeting; May 31–June 4, 2014; Montreal, QC, Canada.

Acknowledgments

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Disclosures

The authors declare no conflicts of interest with regard to this study. The authors were employed by EMD Serono, Inc. and CBPartners, New York, NY, USA.*

Table 1. Model input values.

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Cohort sample size</td>
<td>1000 patients</td>
</tr>
<tr>
<td>Risk of relapse at 2 years</td>
<td>0.74 SC IFN beta-1a, 0.51 IM IFN beta-1a</td>
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<tr>
<td>Direct medical cost of relapse</td>
<td>$514</td>
</tr>
<tr>
<td>Annual cost of therapy</td>
<td>$5,918.75 IM IFN beta-1a, $6,082.75 SC IFN beta-1a</td>
</tr>
</tbody>
</table>

Table 2. Two-way sensitivity analyses: number of relapses avoided.

<table>
<thead>
<tr>
<th>IM IFN beta-1a</th>
<th>SC IFN beta-1a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of relapse – low (95% CrI)</td>
<td>0.47</td>
</tr>
<tr>
<td>Risk of relapse – high (95% CrI)</td>
<td>0.69</td>
</tr>
</tbody>
</table>

Table 3. Two-way sensitivity analyses: cost of relapses avoided.

<table>
<thead>
<tr>
<th>IM IFN beta-1a</th>
<th>SC IFN beta-1a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of relapse – low (95% CrI)</td>
<td>$1,095,050</td>
</tr>
<tr>
<td>Risk of relapse – high (95% CrI)</td>
<td>$2,052,934</td>
</tr>
</tbody>
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