Objective

Interferon beta can be effective first-line therapy for clinically isolated syndrome (CIS) and clinically definite multiple sclerosis (MS). Their effectiveness may be reduced by neutralizing antibodies (NAb) against interferon beta as well as by patient non-adherence, resulting in increased relapse.

Particular types of interferon beta drugs differ in level of adherence to MS treatment and risk of NAb development. Intramuscular (IM) interferon beta has been shown to decrease relapse rates and to decrease the risk of NAb development.

The objective of this study was to compare clinical outcomes (reduction in the number of relapses) and costs associated with MS treatments and interferon beta treatment options available in the Czech Republic over a five-year period. The study's perspective was taken into consideration development of NAb and patient adherence.

Methods

A Markov cohort model was developed using MS Excel 2010 with a time horizon of one year. The model simulates the treatment path of patients with MS (Figure 1), taking into account the risk of NAb development, levels of adherence to MS treatment across a range of treatment options, and transition outcomes using clinical trial data and clinical experience in the Czech Republic. The model was developed with the inputs of rates of NAb development, relapse rates and associated costs of drugs derived from the literature. The model also assumed that the development of NAb is permanent, which means that costs associated with the development of NAb should be discounted.

The main result of the study is that the incremental cost-effectiveness ratio (ICER) of fingolimod vs. SC INF-β1a ranges from €12,069 to €14,387 per quality-adjusted life year (QALY) gained. The ICER of fingolimod vs. SC INF-β1b ranges from €12,069 to €14,387 per QALY gained. The ICER of fingolimod vs. Natalizumab ranges from €12,069 to €14,387 per QALY gained. The ICER of fingolimod vs. IFN-β1a/β1b ranges from €12,069 to €14,387 per QALY gained.

Conclusions

Intramuscular interferon beta-1a represents the dominant intervention in the Czech Republic for first-line MS treatment in terms of our health economic evaluation. IM interferon beta-1a appears to be a cost-saving intervention from the payer's perspective (perspective of health insurance funds) and, simultaneously, a more efficacious intervention in terms of relapse rate reduction due to higher patient adherence and lower incidence of NAb development when compared to the other interferon beta drugs available in the Czech Republic.

The SA showed that the results are the most sensitive to relapse rate and the adherence parameter.

The limitation of this analysis may be that no quality of life data were included. However, we assume that the results would be even more in favor of IM interferon beta-1a utility (quality of life data) were included. Another possible limitation of this study is the omission of disability progression data in our model. Assumptions about the time period of NAb development and their persistence represent another parameter that could have an impact on the results. For example, patients may experience multiple NAb development and associated costs in clinical outcomes between analyzed DMMs will be even more pronounced. Finally, the development of NAb, which could completely prevent the activity of interferon beta i.e., increase costs and differences in clinical outcomes between analyzed DMMs will be even more pronounced. Finally, the development of NAb, which could completely prevent the activity of interferon beta i.e., increase costs and differences in clinical outcomes between analyzed DMMs will be even more pronounced. Finally, the development of NAb, which could completely prevent the activity of interferon beta i.e., increase costs and differences in clinical outcomes between analyzed DMMs will be even more pronounced.