Clinical and Economic Impact of Early Treatment of Multiple Sclerosis with Highly Effective Therapy

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OBJECTIVES

Evaluate the clinical and economic impact of early high-efficacy DMT use in RRMS by comparing four treatment strategies in Mexico: non DMTs, moderate-efficacy DMTs, escalation, and early high-efficacy initiation.

INTRODUCTION

Multiple sclerosis (MS) is a chronic, immune-mediated disease; **the relapsing-remitting form (RRMS) is most common, causing relapses that lead to cumulative neurological damage and disability[1,3,4].**

MS imposes a significant clinical and economic burden, but despite its high cost, **disease - modifying therapies (DMTs) reduce relapses, slow progression, and improve quality of life[2,5,7].**

13.1

In Mexico, **MS prevalence is 13.1/100,000**; treatment has shifted from symptomatic care to moderate- and high-efficacy DMTs, enabling strategies like escalation and early high-efficacy initiation, with international evidence favoring the latter[6].

All four treatment strategies coexist in Mexico, driven by delayed diagnosis, unequal healthcare access, and limited availability of innovative therapies in the public sector

METHODS

- A **Markov model** was developed to evaluate adult patients with relapsing-remitting multiple sclerosis (EMRR) from the **health system perspective**, with annual cycles over a **15-year horizon**.
- The model included **four health states** (mild [Expanded Disability Status Scale (EDSS) <4], moderate [EDSS 4–6], severe [EDSS ≥6], and death). Patients could remain in their current state, progress, or die; only **forward transition probabilities** were considered.
- **Disease progression**, expressed as changes **in EDSS scores**, was used as the efficacy parameter and was driven by transition probabilities derived from published literature[2,5,7].
- **Costs (direct medical, direct non-medical, and indirect)** were assigned per health state, with patients entering the model at mild disability (EDSS <4).

RESULTS

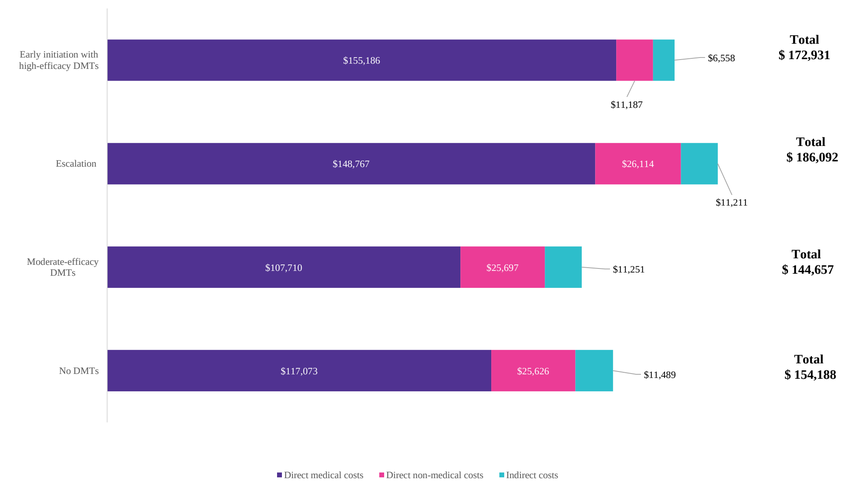
- Total costs were categorized into three main components: direct medical costs, direct non-medical costs, and indirect costs **Table 1**.

Table 1. Cost Components of RRMS from a Societal Perspective

Direct medical costs	Direct non-medical costs	Indirect costs
• Pharmacologic treatment (symptomatic treatment moderate and high-efficacy DMTs) • Hospitalizations • Relapse management • Laboratory and imaging tests • Neurology consultations • Physical therapy or rehabilitation services	• Out of pocket expenses • Informal caregiving • Domestic support • Assistive devices (canes and wheelchairs)	• Productivity losses (absenteeism and presenteeism) • Early retirement or disability pensions

Source: Own elaboration.

Figure 1: Average 15-year costs per treatment strategy from the health system perspective (USD)



Source: Own elaboration. Total represent the sum of direct medical, direct non-medical, and indirect costs.

- Early initiation with high-efficacy DMTs yielded a lower total cost ($172,931) than escalation($186,092), mainly by reducing non-medical and indirect costs, leading to savings of $13,161 vs. escalation strategy in **Figure 1**.
- While **Figure 1** illustrates cost differences, **Table 2** highlights that escalation and lower-efficacy/no DMT strategies are associated with a higher disability burden and fewer years of life with mild disability, rather than directly reflecting cost outcomes. These findings suggest that the long-term clinical impact of early high-efficacy treatment may not be immediately captured through cost data alone.

Table 2: Impact of MS Treatment Strategies on Life Years and Disability Burden

	No DMTs	Moderate-efficacy DMTs	Escalation	Early initiation with high-efficacy DMTs
Years of life gained	**13.9**	**14.7**	**15.0**	**15.0**
Years of life with mild disability	9.3	9.5	9.5	12.8
Years of life with moderate disability	3.0	3.9	4.3	2.1
Years of life with high disability	1.6	1.3	1.2	0.0
Years of life lost	1.1	0.3	0.0	0.0

Source: Own elaboration
A color gradient was applied by row to facilitate interpretation of the comparative results across treatment strategies. Green cells represent the best outcomes within each row. Red cells represent the worst outcomes. Outcomes are reported in years.

- Early high-efficacy DMTs = better outcomes → more years with mild disability (12.8 vs 9.3–9.5), no years with high disability, and no life years lost in **Table 2.**
- Compared to escalation, early treatment delays disability progression, improves quality of life, and keeps patients longer in favorable health states in **Table 2.**

CONCLUSIONS

- **Early initiation with high-efficacy DMTs was associated with the most favorable clinical outcomes, including more years of life with mild disability (lower EDSS states) and elimination of life years lost, compared with other treatment strategies.**
- **This approach reduced the burden of moderate and severe disability, indicating a potential to maintain patients longer in lower EDSS states and delay disease progression.**
- **In terms of costs, early initiation with high-efficacy DMTs showed lower total costs compared with the escalation strategy, but similar or slightly higher costs compared with moderate- or no-DMT scenarios. These differences are mainly driven by higher direct medical costs that may be offset by improved functional outcomes and productivity preservation over time.**
- **Although cost differences were modest, the clinical benefits and reduced disability burden suggest broader long-term economic and societal advantages with early high-efficacy DMT use in RRMS.**
- **Overall, findings support the clinical and economic value of early high-efficacy DMTs compared with delayed or lower-efficacy approaches, emphasizing the importance of early disease control rather than escalation.**

Statement for Author declaration. Conflicts of Interest:
Karina Carrillo declares declare no conflicts of interest
Victor Gasca declares declare no conflicts of interest
Margarita Fuentes and Iliana González are employees of Merck Biopharma Distribution S.A. de C.V., Naucalpan de Juarez, Mexico, an affiliate of Merck KGaA

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