

INTRODUCTION

- Numerous studies conclude that adherence to injectable disease-modifying treatments (DMTs) for multiple sclerosis (MS) is suboptimal.<sup>1,2</sup>
- Among other factors, studies have found that adherence to injectable DMTs for MS is higher when dosing frequency is lower.<sup>3-5</sup>
- Overall, the literature on adherence to injectable DMTs for MS suggests that improvements in administration, including reduced dosing frequency and/or increased ease of administration via the use of autoinjectors, could improve adherence and treatment outcomes and are an important goal.<sup>1,6</sup>

OBJECTIVE

- The objective of this study is to quantify preferences for features of hypothetical injectable DMTs among individuals in the United States (US) living with MS.

METHODS

Study sample

- All Global (www.allglobal.com) administered an online survey to respondents who were members of an online panel of consumers in the US.
- All respondents were aged 18 years or older and had a self-reported physician-diagnosis of MS.

Discrete-choice experiment

- The study employed a best-practice discrete-choice experiment (also known as DCE or choice-format conjoint analysis).<sup>7,8</sup>
- DCE elicits preferences for treatment features and patients' willingness to trade off among features.
- DCE postulates that the benefit or utility of a treatment is a weighted sum of its features, where the weights reflect study respondents' perceived relative importance of each feature.
- DCE questions elicit preferences using a series of hypothetical treatments pairs between which respondents are asked to choose.
- Statistical analysis of the choice patterns reveals the relative importance weights.
- Each hypothetical treatment was described using the six attributes in Table 1. The treatment attributes and attribute levels were informed by the features of currently available injectable MS treatments, selected clinical study findings, and consultation with clinical experts.

Table 1: Attributes and levels for the treatment-choice questions

Attribute	Levels
Number of years until MS symptoms get worse	4 years
	2 years
	1 year
Number of relapses in the next 4 years	1 relapse
	3 relapses
	4 relapses
Injection time	3 seconds
	10 seconds
Frequency of injections	1 time each month (monthly)
	2 times each month (biweekly)
	4 times each month (weekly)
	12 times each month (3 times each week)
Flu-like symptoms	30 times each month (daily)
	No flu-like symptoms after any injections
	Symptoms for 1 day after some injections
Injection-site reactions	Symptoms for 3 days after some injections
	Symptoms for 3 days after every injection
	No reaction
	Mild

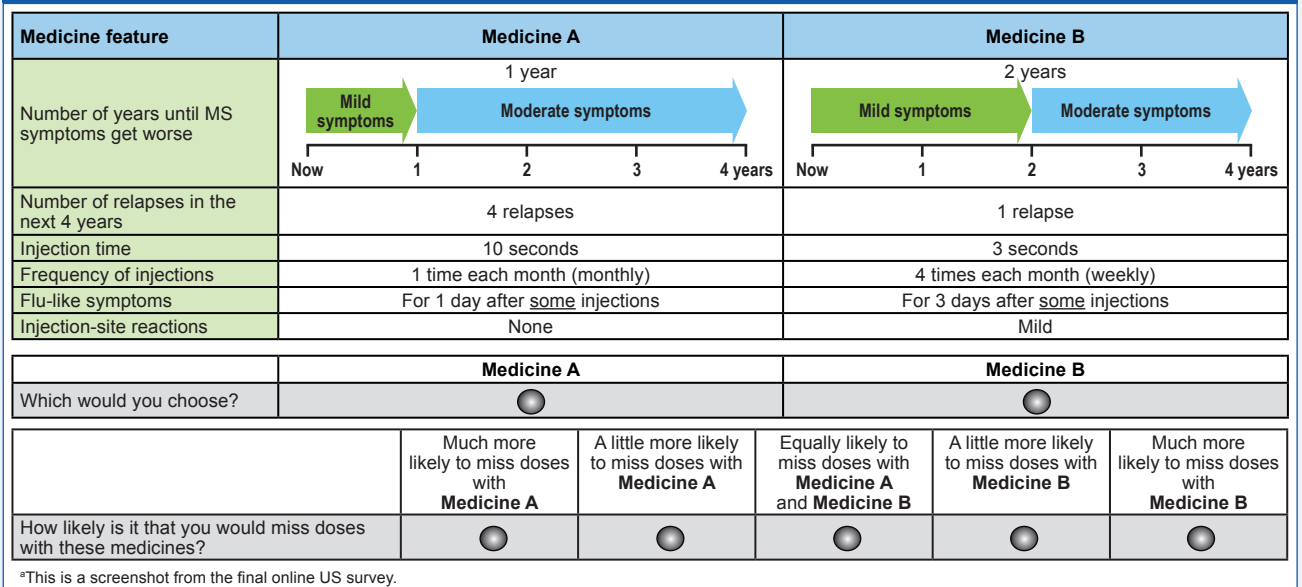
Experimental design

- Hypothetical treatments were constructed using the information in Table 1.
- The treatments and treatment pairs were determined using a best-practice experimental design with known statistical properties that optimizes the statistical information generated from a given sample size.<sup>9</sup>
- Forty-eight treatment pairs were divided into 6 survey versions of 8 questions, and 1 question was repeated to assess response stability.
- Respondents were randomly assigned to one of the survey versions.
- Figure 1 presents an example treatment-choice question.

Model and analysis

- Treatment-choice data were analyzed using a random-parameters logit (RPL) model.
- The dependent variable is the choice from the DCE questions. Independent variables include all attribute levels in Table 1.

Figure 1: Example treatment-choice question<sup>a</sup>



<sup>a</sup>This is a screenshot from the final online US survey.

- RPL regression parameters are preference weights, or utilities, of attribute levels. The vertical distance between attribute levels measures the relative importance, or utility differences, of changes in treatment attributes.
- In addition to providing estimates of preference weight estimates, RPL also controls for heterogeneity in preferences and the panel nature of data.<sup>10,11</sup>

RESULTS

Sample

- 205 adults completed the survey.
- 13 respondents (6%) were excluded because their responses indicated that they may not have paid close attention to the choice tasks; excluding these respondents did not affect the study results.
- The final sample size for analysis was 192 respondents.
- Sample characteristics are reported in Table 2

Table 2: Characteristics of survey respondents

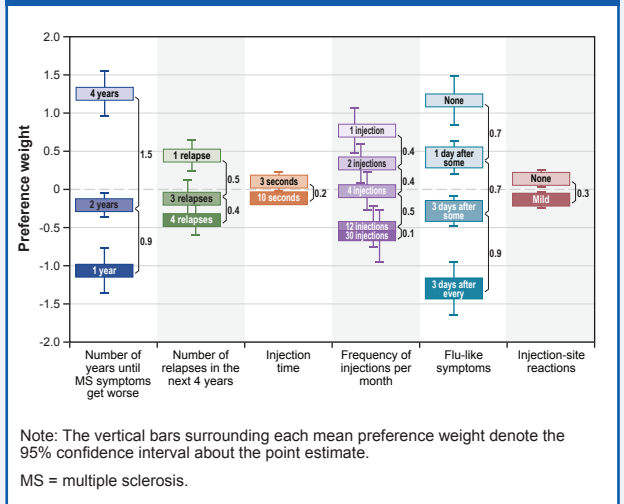
Characteristic	(N = 192)
Age, mean (SD)	50 (12)
Female	78%
Employed full-time	22%
Type of MS <sup>a</sup>	
Relapsing-remitting	68%
Secondary-progressive	16%
Primary-progressive	7%
Progressive-relapsing	5%
Number of years since MS diagnosis, mean (SD)	12 (7)
Number of relapses in last 2 years, mean (SD)	4 (5)
Has never been prescribed a medicine to take on a regular basis to manage MS	6%
Injection-naïve <sup>b</sup>	29%
MS symptoms, on most days <sup>c</sup>	
No limitations	9%
Mild symptoms	16%
Moderate symptoms	29%
Need cane for long distances	9%
Need cane for short and long distances	21%
Need bilateral support	7%
Need wheelchair or scooter	9%
Seconds it takes for medicine to come out of injection device, mean (SD)	
Among those currently receiving regular injections	7 (5)
Among those who have received regular injections in the past	12 (18)
Ever had flu-like symptoms caused by your MS medicines	55%
Has had a mild injection-site reaction	57%

<sup>a</sup>4% indicated "Do not know or not sure" on the type of MS that they have. <sup>b</sup>Has never received injections on a regular basis to treat MS. <sup>c</sup>As described in the Hohol scale.<sup>12</sup> MS = multiple sclerosis; SD = standard deviation.

Preference weights

- The results of the RPL estimation (Figure 2) show that respondent preferences were consistent with the expectation that better outcomes (e.g., better efficacy, fewer side effects, more convenient administration) would be preferred to worse outcomes.
- The relative importance of an improvement in the number of years until disability progression from 1 to 2 years was 0.9. This improvement was:
  - Equivalent to improving the number of relapses in the next 4 years from 4 to 1, improving the frequency of injections from 12 to 2 times per month, and improving flu-like symptoms from 3 days after every injection to 3 days after some injections
  - Three times as important as improving injection-site reactions from mild to none
  - Two times as important as reducing the number of relapses in the next 4 years from 4 to 3
  - Four times as important as decreasing injection time in seconds from 10 to 3.

Figure 2: RPL regression parameters, or preference weights (N = 192)



Note: The vertical bars surrounding each mean preference weight denote the 95% confidence interval about the point estimate. MS = multiple sclerosis.

CONCLUSIONS

- Results from this study show that among individuals in the US living with MS:
  - Lengthening the time until disability progression from 2 years to 4 years was a key driver of patient preferences.
  - Reducing the number of relapses was less important than disability progression but still desirable to patients.
  - Weekly and daily injections were less preferred than less frequent injection schedules, as were flu-like symptoms with longer duration.
  - Respondents did not give great weight to changes in injection time or injection-site reactions.
- These results suggest that injection frequency may be as important to patients as some efficacy or side effect attributes of MS injectable treatments.

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DISCLOSURES

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