

# Economic advantages associated with Multiple Sclerosis specific DMTs route of administration

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## OBJECTIVE

To explore possible economic advantages associated to DMTs' route of administration in multiple sclerosis (MS).

## METHODOLOGY

We studied the correlation between DMT route of administration (intravenous I.V., subcutaneous S.C., oral) and overall patient's direct medical costs financed by the Italian National Healthcare System (NHS).

This analysis is part of a wider, burden of disease project for which we used a specific MS patient questionnaire directly administered to MS patients. We received 592 answers.

Seven regressions have been performed; each regression has as dependent variable the direct costs financed by NHS, overall (apart from drug costs) and by single cost category (hospitalizations, Day Hospital (DH)/outpatient visits etc.) and as independent variable the administration route of the disease modifying treatment (DMT): S.C, I.V. and oral.

Regressions have been controlled for independent variables other than administration route which could have had an impact on direct costs, such as demographic variables and disease severity.

The sample of the analysis included 592 patients.

All results are weighted based on the severity distribution reported by Ponzio et al. 2015<sup>1</sup>  
1. Ponzio M. et al. Economic impact of multiple sclerosis in Italy: focus on rehabilitation costs. *Neurol Sci.* 2015 Feb;36(2):227-34.

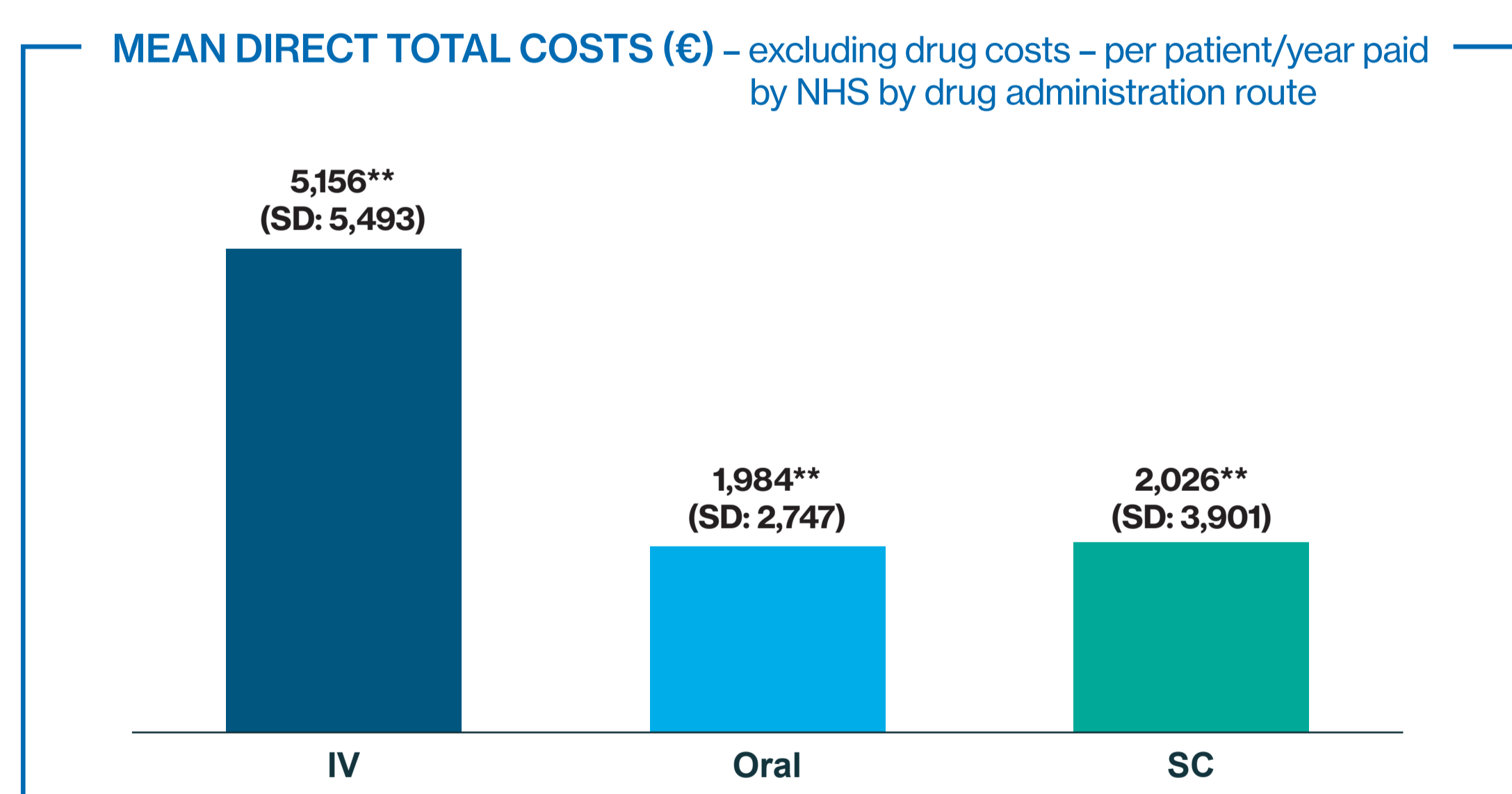
The selected regression for the analysis in scope is the one presented below:

$$\text{Direct NHS costs} = \text{administration mode} + \text{visits} + \varepsilon$$

## RESULTS

Total direct costs paid by the Italian Healthcare System (NHS), per MS patient/year, net of drug costs, by drug administration route.

- On average, the NHS finances a total expenditure, excluding drug costs, of 3,165€ yearly for every patient taking at least one disease modifying drug
- Total expenditure includes costs of hospitalizations, day hospital / outpatient visits, rehabilitation, extra visits, exams and external aids / orthoses
- Average direct cost – excluding drug costs – of patients being treated with intravenous drugs is higher than 5,000€ per year, vs about 2,000€ for patients taking oral or subcutaneous drugs
- The difference in total direct costs, net of drug costs, paid by NHS is statistically significant\*\* between the different administration routes



IV: intravenous; SC: subcutaneous | Sample: 592 MS patients | \*\* Difference statistically significant  $p < 0,05$  Kwallis test

## CONCLUSIONS

Both descriptive statistics and inferential statistics show that there is a significant difference in the direct costs – excluding drug costs – paid by NHS, by administration route (SC/Oral vs IV)

- Average direct cost of patients being treated with intravenous drugs is higher than 5,000€ per year, vs about 2,000€ of patients taking oral or subcutaneous DMTs. This difference is statistically significant
- The main driver of this cost difference is associated with outpatient costs due to the significantly different number of accesses in DH/day service day hospitals/day services
- When controlling for the other possible explanatory variables, a patient treated with a subcutaneous drug is expected to costs to the NHS on average 56% less than a patient treated with an intravenous drug
- Moreover, a patient treated with a subcutaneous drug is expected to costs to the NHS on average 65% less than a patient taking an intravenous drug for day hospital/day service and outpatient visits

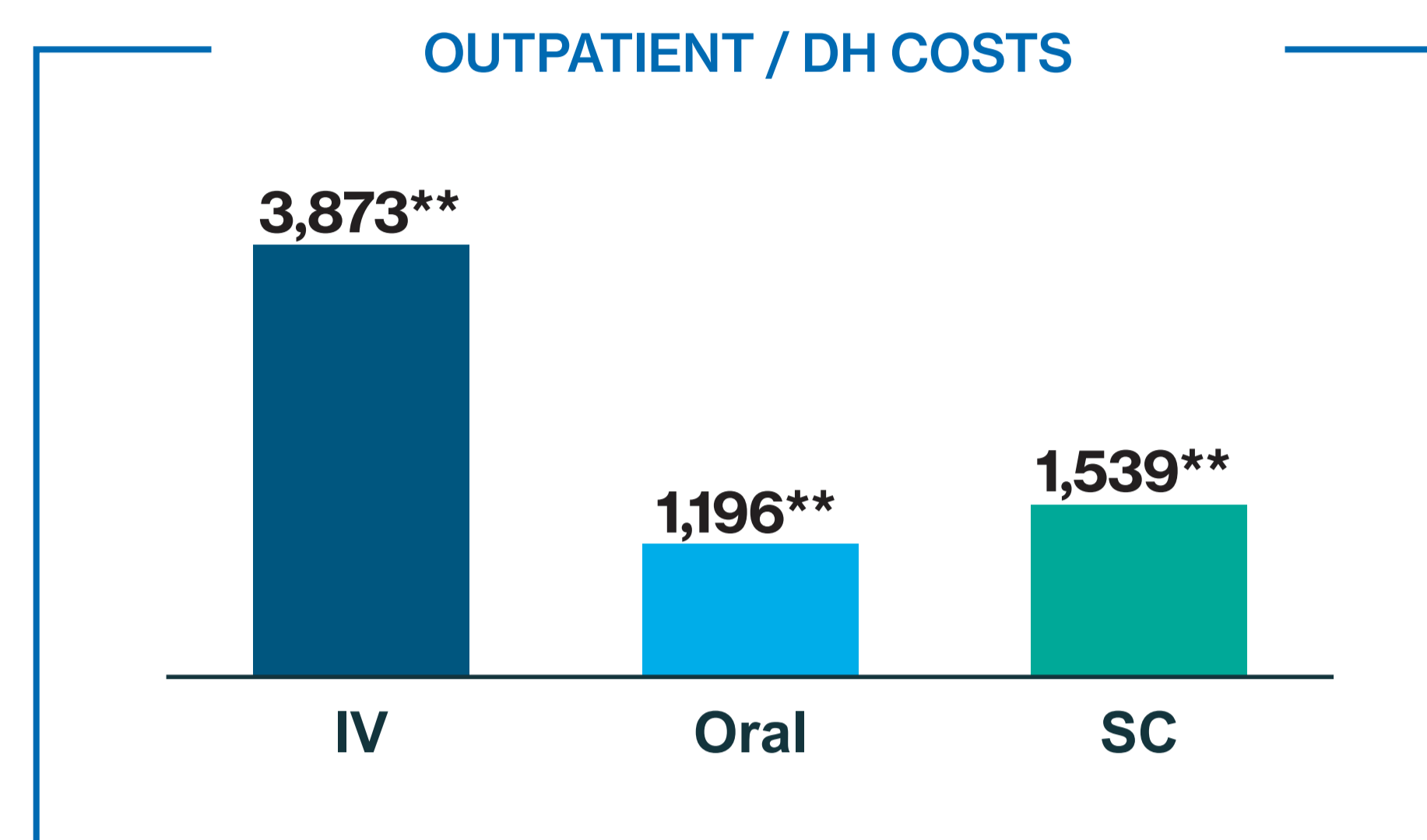
The results of this analysis suggest that the route of administration of the DMTs may have an important impact on the healthcare costs supported by the Italian NHS. Larger studies may be useful to better quantify this aspect.

## ACKNOWLEDGEMENTS:

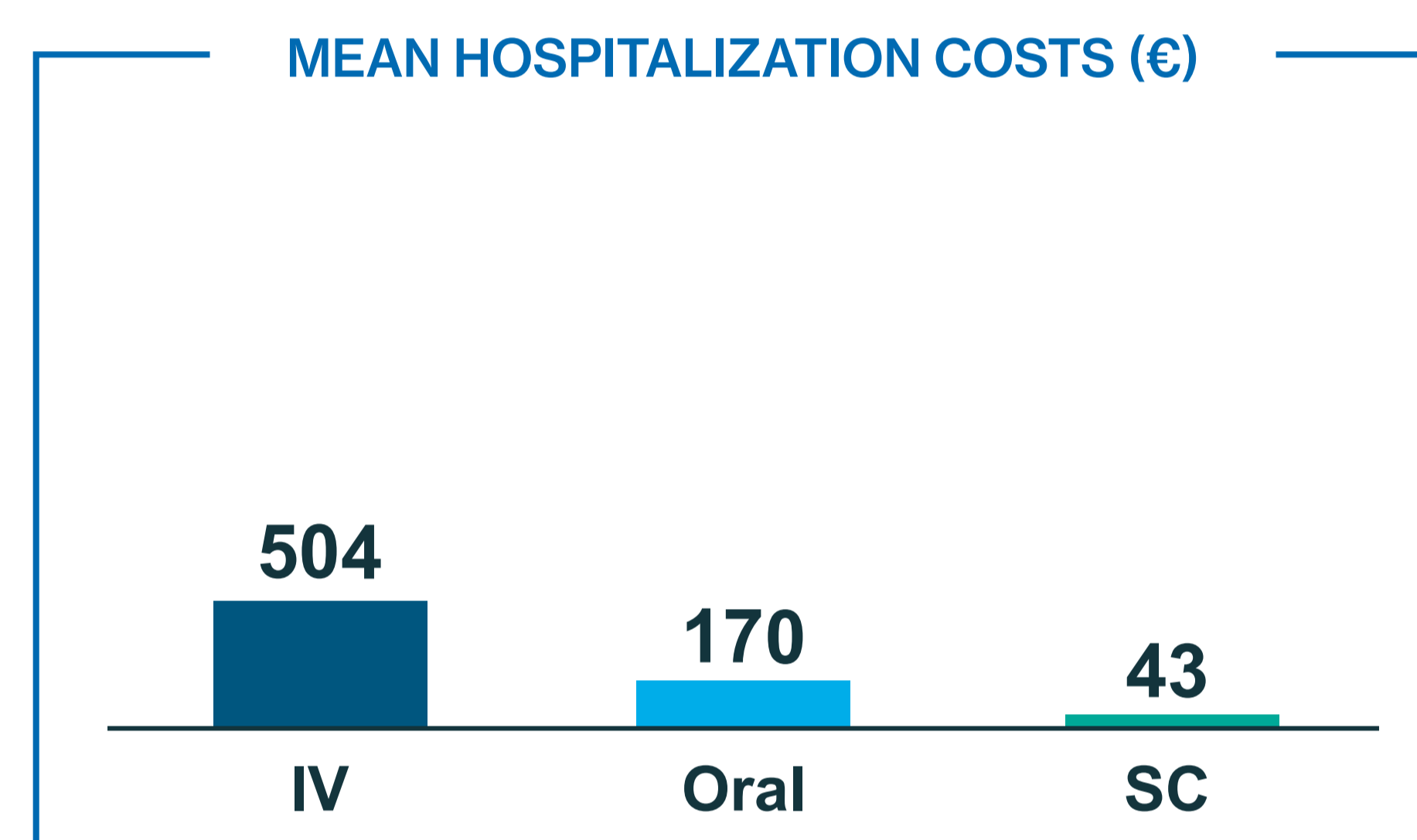
WE thank IQVIA for the technical support and the analysis. This analysis was supported by Novartis Farma SpA.

Direct costs per MS patient/year paid by the NHS net of drug costs by drug administration route and by cost item

- Outpatient/DH costs have a very important impact: 3,900€ yearly in patients with IV administered DMTs, vs. 1,200€ in patients with orally administered DMTs vs. 1,500€ in patients with SC administered DMTs, and the difference is statistically significant



- Hospitalization costs have an important impact: 504€ yearly in patients with IV administered DMTs, vs. 170€ in patients with oral administered DMTs vs. 43€ in patients with SC administered DMTs, but the difference is not statistically significant



IV: intravenous; SC: subcutaneous | Sample: 592 MS patients; All costs are direct and paid by the NHS | \*\* Difference statistically significant  $p < 0,05$  Kwallis test

Average number of Day Hospital accesses per patient/year by drug administration route.

- The impact of the drug administration route on the outpatient / DH costs is mainly due to the fact that patients taking intravenous drug have more DH visits than patients receiving subcutaneous or oral treatments
- Indeed, patients treated with subcutaneous drugs make on average 56% less day hospital accesses than patients treated with intravenous drugs
- The difference in number of DH accesses is statistically significant between the routes of administration.

Drug administration route	Average DH accesses per year
Intravenous	5.12 (SD: 5.02)
Oral	1.89 (SD: 2.65)
Subcutaneous	2.22 (SD: 3.67)

-2.9 access on average (-56%)

IV: intravenous; SC: subcutaneous | Sample: 592 MS patients | SD: Standard Deviation

When controlling for other possible explanatory variables (age, gender, multiple sclerosis type, EDSS score, education, employment status, insurance, presence of a caregiver) through a Poisson regression, results appear statistically significant, that is, changing administration route from IV to SC (or oral) the number of day hospital access decrease significantly.