DX15

Comparison of Costs and Health Resource Utilization in Patients with Multiple Sclerosis Treated with Disease-Modifying Therapies

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INTRODUCTION

- Multiple sclerosis (MS) is a chronic and debilitating disease that affects approximately 570,000 individuals in the USA, and 2.3 million worldwide.[1,2]
- Disease-modifying therapies (DMTs) have the potential to reduce the number and severity of disease relapses in patients with relapsing MS.[3]
- Although reduced healthcare resource utilization (HRU) associated with improved patient outcomes has the potential to partially offset DMT acquisition costs, real-world data on comparative HRU and costs associated with DMT use in routine clinical practice are limited.

OBJECTIVE

- To estimate the HRU and costs for patients with MS who did not receive DMT in the previous year, and initiated dimethyl fumarate, interferon β, glatiramer acetate, teriflunomide or fingolimod in routine clinical practice.

METHODS

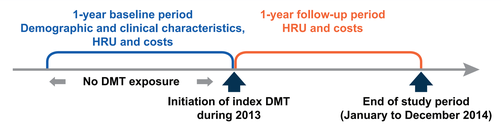
Data Source

- Truven MarketScan Commercial Claims Databases: Administrative claims and eligibility records of 80 million commercially-insured individuals from the USA:
  - Medical services claims for inpatient and outpatient settings with associated procedure and diagnosis codes submitted for reimbursement
  - Pharmacy dispensing claims
  - Demographic information including age, sex, health plan type, and region of residence.
- Data were collected between January 2012 and December 2014, inclusive.

Patient Identification

- Adult patients with MS who initiated a DMT during 2013 were included in the analysis (Figure 1, Figure 2). Index date was defined as the first claim for a new DMT.
- To fully understand the impact of initiating DMT on HRU and costs, only patients with no DMT exposure in the year before the index date were included in the analysis.

Figure 1. Schematic figure of patient selection

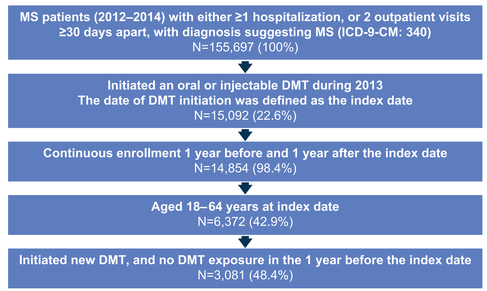


DMT, disease-modifying therapy; HRU, healthcare resource utilization.

Study Measures

- Patient demographics included age at index date, sex, type of health plan and region of residence.
- Baseline clinical characteristics were assessed based on claims dated within 1 year before the index date and included chronic disease burden (measured by Charlson Comorbidity Index [CCI]) and MS-related symptoms.

Figure 2. Patient selection



DMT, disease-modifying therapy; ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; MS, multiple sclerosis.

  - CCI is a composite score based on the presence of 22 chronic conditions, such as diabetes, liver disease and cancer. Initially developed to predict 10-year mortality, it is widely used to assess chronic disease burden in large retrospective studies.
- HRU was defined as the proportion of patients who were hospitalized or had emergency room (ER) visits (including urgent care [UC]) visits) during 1 year before and 1 year after the index date.
- Total healthcare costs and costs by setting (inpatient, outpatient, UC/ER and pharmacy) were estimated for 1 year before and 1 year after the index date. Medical costs excluded costs of prescriptions. Costs were adjusted to 2014 values based on the Consumer Price Index Medical Component.[4]

Statistical Analysis

- Analysis of variance method (continuous variables and counts) and Chi-squared test (categorical variables) were used to detect significant differences across cohorts.
- For HRU and costs in 1 year before and 1 year after the index date, paired t-test (costs) and the McNemar test (categorical variables) were used to detect significant changes over time.
- Difference-in-difference (DiD) method was used to assess group differences in healthcare costs over time, while adjusting for age, sex and CCI score.

RESULTS

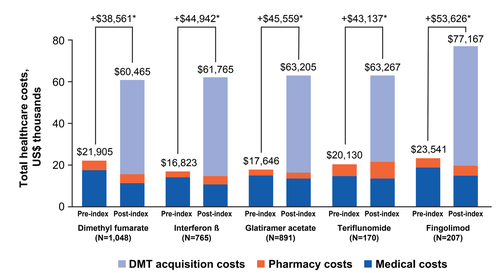
- Overall, 3,081 patients were included in the analysis. Mean patient age ranged from 43.2 years for glatiramer acetate to 48.6 years for teriflunomide; between 76.9% and 84.1% of patients were female (Table 1).
- Total healthcare costs significantly increased in the post-index period for all DMTs (Figure 3; all p<0.0001). Cost increases for patients receiving dimethyl fumarate were significantly lower than for patients receiving interferon β, glatiramer acetate and fingolimod, measured using DiD analysis after adjusting for confounders (p<0.01 for all comparisons).
- Medical costs were significantly reduced in the dimethyl fumarate and interferon β cohorts after DMT initiation (Figure 4; both p<0.01).
- Medical cost reductions (excluding prescription medicine costs) in the post-index period were driven largely by cost decreases for outpatient services and hospitalizations (Table 2). Statistical comparison of HRU across cohorts showed a similar pattern to healthcare cost comparisons (data not shown due to space constraint).

Table 1. Baseline demographic and clinical characteristics

	Dimethyl fumarate (N=1,048)	Interferon β (N=765)	Glatiramer acetate (N=891)	Teriflun-omide (N=170)	Fingo-limod (N=207)	p-value
Age, mean (SD) years	45.4 (9.9)	43.7 (10.8)	43.2 (10.3)	48.6 (9.2)	44.4 (10.0)	<0.0001
Female, % patients	76.9	78.2	79.0	84.1	78.7	0.30
US region of residence, % patients						<0.01
Northeast	26.5	21.2	26.9	20.6	22.2	
Midwest	23.1	27.1	19.8	26.5	30.4	
South	30.3	36.3	31.8	35.9	32.4	
West	18.4	14.5	19.9	14.7	14.0	
Unknown	1.6	0.9	1.7	2.4	1.0	
Health plan type, % patients						0.94
HMO	9.9	12.2	11.3	7.6	10.1	
POS	7.3	6.1	6.4	4.7	6.3	
PPO	61.1	61.0	62.2	65.3	61.4	
CHDP	12.7	11.4	10.7	14.7	14.5	
Other	9.1	9.3	9.4	7.6	7.7	
CCI score, mean	0.65	0.73	0.78	0.69	0.48	0.02
CCI score, % patients						
0	69.0	68.4	66.0	65.9	75.4	
1	11.3	6.9	9.8	11.8	11.1	
2	12.2	16.2	14.5	14.1	7.2	
≥3	7.5	8.5	9.8	8.2	6.3	

CCI, Charlson Comorbidity Index; CHDP, Child Health and Disability Prevention; HMO, Health Maintenance Organization; POS, Point-of-service; PPO, Preferred Provider Organization; SD, standard deviation.

Figure 3. Total healthcare costs for 1 year before and 1 year after the index date for patients with MS and no DMT exposure during the year before the index date



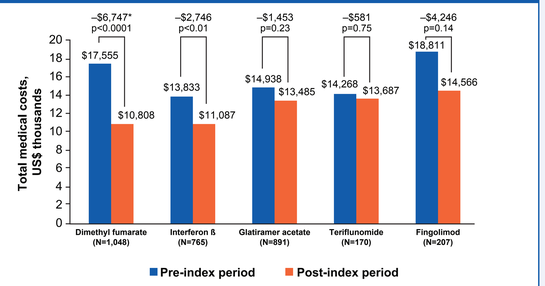
*For each DMT, post-index total healthcare costs were significantly different to pre-index costs (p<0.0001 for all DMTs).
DMT, disease-modifying therapy; MS, multiple sclerosis.

Table 2. Cost difference in post-index year *vs.* pre-index year for total medical and drug acquisition costs for patients with MS and no DMT exposure during the year before the index date

	Dimethyl fumarate (N=1,048)	Interferon β (N=765)	Glatiramer acetate (N=891)	Teriflun-omide (N=170)	Fingo-limod (N=207)
Cost difference in post-index year *vs.* pre-index year, US$					
Total medical costs, mean	**–6,747**	**–2,746**	**–1,453**	**–581**	**–4,246**
Inpatient stays, mean	–919	–1,072	+831	+89	–70
ER visits, mean	–259	–530	–483	–64	+77
Outpatient services, mean	–5,569	–1,145	–1,801	–606	–4,253
Drug acquisition, mean					
DMT	+45,000	+46,916	+46,318	+41,848	+57,400
Non-DMT	+308	+772	+694	+1,871	+471

DMT, disease-modifying therapy; ER, emergency room; MS, multiple sclerosis.

Figure 4. Non-prescription medical costs for 1 year before and 1 year after the index date for patients with MS and no DMT exposure during the year before the index date



*Difference-in-difference analysis adjusted for confounders indicated that total medical costs in the post-index period were significantly lower in the dimethyl fumarate cohort than interferon β (p=0.009), glatiramer acetate (p=0.001) and teriflunomide (p=0.012) cohorts. DMT, disease-modifying therapy; MS, multiple sclerosis.

Limitations

- Our study examined healthcare resource utilization and costs in the 1 year before and 1 year after DMT initiation. Future studies need to assess outcomes over a longer time period.
- Claims data are recorded for accounting purposes and not specifically for clinical research.
- Data did not provide clinical information required to assess disease severity.

CONCLUSIONS

- After DMT initiation, total healthcare costs increased in all cohorts, with average increases ranging from $38,561 in the dimethyl fumarate cohort to $53,626 in the fingolimod cohort.
- Total non-prescription medical costs decreased after DMT initiation, with the largest decrease observed in the dimethyl fumarate cohort.
- Reductions in total medical costs (excluding prescription medication costs) were associated with decreased use of both outpatient services and inpatient hospital stays, suggesting that increased acquisition costs for DMTs are partially offset by reduced HRU and costs.
- Decreased use of inpatient and outpatient services is anticipated to provide benefits to both patients and healthcare providers.

References

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Disclosures

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