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Health Benefit Costs Among Employees With Multiple Sclerosis

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Introduction

- Multiple sclerosis (MS) is an acquired inflammatory and immune-mediated disorder of the central nervous system characterized by inflammation, demyelination, and degeneration of axonal neurons that affects more than 2 million people worldwide, and estimates range from 350,000 to 440,000 patients in the United States.[1,2]
- MS usually affects young adults between the ages of 20–40 years, with a female-to-male risk ratio between 1.5 and 3.6.[3,4]
- Several studies have reported that patients with MS have difficulty maintaining employment due to the condition.[5]
- Disease-modifying therapies (DMTs, immunomodulators) for MS aim to reduce the frequency and severity of relapses, delay disability, and postpone the onset of the progressive phase of the disease. Available DMTs include the following:
  - Interferon (IFN):
    - Avonex® (intramuscular [IM] IFNβ-1a)
    - Betaseron® (IFNβ-1b)
    - Rebif® (subcutaneous [SC] IFNβ-1a)
  - Copaxone® (glatiramer acetate)
  - Tysabri® (natalizumab)
- While efficacy data on the DMTs exist, limited objective data are available on the differences in health benefit costs among employed individuals with MS.

Objective

- The objective of this study was to assess the objective differences in health benefit costs among employees treated with DMTs for MS in a real-world setting.

Methods

- A retrospective analysis was performed on data (1/1/2001 to 6/30/2007) from the Human Capital Management Services (HCMS) Research Reference Database consisting of approximately 550,000 employees representative of the US employed civilian labor force (2004).
- Employer payroll and disability insurance records were analyzed for work absence costs (including sick leave, short-term disability [STD], long-term disability [LTD], and workers' compensation [WC]).
- Anonymity of person-level data was maintained according to the Health Insurance Portability and Accountability Act guidelines.
- Healthcare was provided through managed care plans contracted by respective employers.
- International Classification of Diseases–9 (ICD-9) codes were used to identify patients with MS (ICD-9 code of 340.XX).
- Patients with available prescription claims were assigned to therapy cohorts and followed for 1 year after their initial prescription (index date).

Statistical Analysis

- Demographic characteristics of the cohorts were compared using *t* tests for continuous variables and chi-square (χ^2) tests for discrete variables. Differences were considered significant at $P<0.05$.
- Two-part regression analysis was used to model the health benefit cost differences between the cohorts using separate regression models for days from each type of cost.
- Costs were adjusted using regression modeling, controlling for age, gender, exempt/nonexempt status (exempt employees are not paid on an hourly basis and are not paid for overtime work), full-time/part-time status, salary, and Charlson Comorbidity Index score.[6]
- Only employees eligible for each specific benefit were included in the regression models for that benefit.
- Indirect costs for claims due to sick leave (SL), STD, LTD, and WC include all costs from claims begun at some point during the year following the index date.
- Percentages of costs attributable to each benefit type for each employee were compared using Wilcoxon rank sum tests.

Results

- Records of 785 patients with MS (ICD-9 code of 340.XX) were extracted with 1 year of data beyond the employee's index date. Of these:
  - 311 received a DMT (n=156, Avonex; n=55, Betaseron; n=87, Copaxone; and n=13, Rebif) and were eligible for analysis.
  - No eligible Tysabri patients were found in the data based on the study timeframe and 1-year follow-up inclusion criteria.
- Aside from small geographic differences, patients in the 4 treatment cohorts were similar demographically (Table 1), and all cohorts were mostly female (more than 60%).
  - More Betaseron patients were full-time employees compared with Rebif patients (98.2% vs 84.6%).
  - Avonex patients had been with their current employer longer than Copaxone patients (9.8 vs 7.0 years).

Table 1. Demographic Comparisons

Variable	Employees treated with: Avonex (IM IFNβ-1a) Mean (SE) or percent	Betaseron (IFNβ-1b) Mean (SE) or percent	Copaxone (glatiramer acetate) Mean (SE) or percent	Rebif (SC IFNβ-1a) Mean (SE) or percent
n	156	55	87	13
Age, years at index date	41.48 (0.66)	41.42 (1.03)	39.63 (0.92)	36.90 (1.67)
Tenure, years at index date	9.79 (0.61)	8.80 (1.00)	7.01[a] (0.71)	6.22 (1.63)
Annual salary, US dollars at index date	61,796 (3385)	52,799 (3572)	58,039 (3366)	59,637 (10,921)
Female, %	62.2	61.8	63.2	69.2
Married, %	51.4	57.7	57.3	63.6
White, %	70.2	60.9	70.4	61.5
Black, %	14.0	15.2	5.6	0.0
Hispanic, %	5.3	10.9	7.0	15.4
Exempt, %	44.9	38.2	41.4	46.2
Full-time, %	96.2	98.2	97.7	84.6[b,c]
Charlson Comorbidity Index score	0.224 (0.05)	0.200 (0.09)	0.115 (0.03)	0.154 (0.10)
Region, first digit of zip code, %				
0	17.9	9.1	13.8	0.0
1	14.7	7.3	9.2	0.0
2	15.4	20.0	9.2	15.4
3	14.1	12.7	11.5	0.0
4	5.1	3.6	2.3	0.0
5	0.0	1.8	4.6[a]	7.7[a]
6	6.4	9.1	2.3	7.7
7	14.7	14.5[b]	27.6[a]	46.2[a,c]
8	3.8	9.1	9.2	7.7
9	7.7	12.7	10.3	15.4

[a]$P<0.05$ (vs Avonex [IM IFNβ-1a]); [b]$P<0.05$ (vs Copaxone [glatiramer acetate]); [c]$P<0.05$ (vs Betaseron [IFNβ-1b]).
SE=standard error.

Table 2. Annual Health Benefit Costs for Employees With Multiple Sclerosis by Treatment

Cost category	Employees with Avonex (IM IFNβ-1a) treatment n	Adj mean cost	Employees with Betaseron (IFNβ-1b) treatment n	Adj mean cost	Employees with Copaxone (glatiramer acetate) treatment n	Adj mean cost	Employees with Rebif (SC IFNβ-1a) treatment n	Adj mean cost
Healthcare	156	$4047	55	$2984	87	$5127[a]	13	$5398
Prescription drug	156	$13,292	55	$13,634	87	$12,995	13	$17,934
Sick leave	81	$523	22	$1063	33	$969[b]	6	$1431
Short-term disability	84	$87	32	$272	48	$1056[b]	11	$2207
Long-term disability	110	$202	44	$0	70	$1046	10	$0
Workers' compensation	139	$16	49	$0	74	$2	11	$0
Total costs		$18,167		$17,953		$21,194		$26,970

[a]$P<0.05$ vs Betaseron (IFNβ-1b); [b]$P<0.05$ vs Avonex (IM IFNβ-1a).

- From the 311 treated patients with MS (Table 2), total health benefit costs were lower for Avonex ($18,167) and Betaseron ($17,953) compared with Rebif ($26,970) and Copaxone ($21,194). Among the 4 DMTs:
  - Avonex patients reported the lowest total SL and STD costs.
  - Avonex patients had significantly ($P<0.05$) lower SL ($523 vs $969) and STD ($87 vs $1056) costs than Copaxone.
  - Avonex patients also had nonsignificantly lower LTD costs ($202) than Copaxone patients ($1046).
  - All other absence comparisons between the cohorts were not significant.
- On a percentage basis (Table 3):
  - The Avonex cohort had the smallest percentage of indirect costs for all cohorts, while the percentage of indirect costs for the Copaxone and Rebif cohorts was 3.2 and 2.9 times higher, respectively.
  - Prescription drug costs were a higher portion of the total benefit costs among employees in the Betaseron cohort than among employees in the Copaxone cohort ($P<0.05$).

Table 3. Contribution of Direct Medical, Prescription, and Indirect Costs by Disease-Modifying Therapy

Cost category, %	Employees with Avonex (IM IFNβ-1a) treatment	Employees with Betaseron (IFNβ-1b) treatment	Employees with Copaxone (glatiramer acetate) treatment	Employees with Rebif (SC IFNβ-1a) treatment
Healthcare	22.3	16.6	24.2	20.0
Prescription drug	73.2	75.9	61.3[a]	66.5
Indirect costs				
Sick leave	2.9	5.9	4.6	5.3
Short-term disability	0.5	1.5	5.0	8.2
Long-term disability	1.1	0.0	4.9	0.0
Workers' compensation	0.1	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0

[a]$P<0.05$ vs Betaseron (IFNβ-1b).

Limitations

- While this study adds to the body of evidence about health benefit costs among employees treated for MS, the study has the same limitations characteristic of database studies using administrative claims (ie, lack of severity classification, MS stage or type) and may not be representative of patients with MS who are not diagnosed, treated, or able to maintain employment.
- Furthermore, the small sample sizes in some of the cohorts suggest results should be interpreted with caution.
- Despite such limitations, the study attempted to control for age, gender, employment status, and severity using the Charlson comorbidity score and thus represents an important addition to the literature.

Conclusions

- **Overall the study results suggest that, among employees treated for MS with DMTs, patients receiving IM IFNβ-1a:**
  - **Reported the lowest SL and STD costs compared with the other 3 DMTs**
  - **Had significantly lower SL costs and STD costs compared with patients receiving glatiramer acetate**
- **These differences in absence suggest that patients with MS treated with IM IFNβ-1a may have higher productivity and lower disability than employees treated with other interferons or glatiramer acetate.**

References

1. Joy JE et al. Available at: http://books.nap.edu/execsumm_pdf/10031.pdf. 2004. Accessed May 13, 2008.
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Health Benefit Cost

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h Multiple Sclerosis

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