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**ASSESSMENT OF INDIRECT COSTS AND ABSENTEEISM  
DUE TO SICK LEAVE BEFORE AND AFTER TREATMENT INITIATION  
FOR MULTIPLE SCLEROSIS IN A U.S. NATIONAL DATABASE**

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**ABSTRACT**

**BACKGROUND:** Only limited data are available on the effect of different Disease Modifying Treatments (DMTs) on indirect costs due to sick leave among employed individuals treated for Multiple Sclerosis (MS).

**OBJECTIVES:** To assess changes in indirect costs and absences due to sick leave among employees treated with DMTs for MS.

**METHODS:** A healthcare claims database of US employees from 2001-2008 was used to identify patients with MS (2 DMT prescriptions or a DMT prescription and an MS diagnosis [ICD-9=340.X]). Costs associated with absenteeism were based on sick leave data recorded by the employers. Employees with at least 6-months history before DMT initialization and 6-month follow-up data were included in the analysis. *T*-tests were used to compare before, after, and changes in indirect costs and absenteeism between and within DMT groups.

**RESULTS:** Data from 153 employees using DMTs were identified; 76 employees (35=Avonex=Interferon [IFN]-β1a-IM; 12=Betaseron=(IFN-β1b); 19=Copaxone=glatiramer acetate; 10=Rebif=IFN-β1a-SC) were eligible for sick leave and included for analysis (see table). No significant differences existed between cohorts in age, gender, certain job-related variables, and pre-period Charlson Comorbidity Index. Before treatment initiation, Avonex users had the highest indirect costs (\$1172) compared to Betaseron (\$765), Copaxone (\$476) and Rebif (\$341). In the 6-months following treatment initiation, Avonex users had a larger indirect costs decrease (60.5%, \$709 decrease to \$464, *P*<0.05) than Betaseron (46.7%, \$357 decrease to \$408), while indirect costs increased for Copaxone (65.5%, \$311 increase to \$788) and Rebif (37.1%, \$126 increase to \$467). The differences between Avonex vs. (Copaxone and Rebif); and B vs. (Copaxone and Rebif) were significant. Only Avonex users had a reduction in absenteeism (from 5.6 to 4.3 days), while absenteeism increased for Betaseron (3.4 to 4.3 days), Copaxone (2.3 to 4.3 days) and Rebif (1.9 to 6.7 days). Copaxone's increase in absence days was significant when compared with Betaseron's increase (*P*=0.0105) and Avonex's decrease (*P*=0.0235).

**CONCLUSIONS:** Among employees treated with DMTs for MS, Avonex users may have significantly greater reduction in indirect costs and fewer absences after therapy initiation. These real-world differences suggest that Avonex patients may have greater reductions in disability than employees treated with other DMTs.

# ASSESSMENT OF INDIRECT COSTS AND ABSENTEEISM DUE TO SICK LEAVE BEFORE AND AFTER TREATMENT INITIATION FOR MULTIPLE SCLEROSIS IN A U.S. NATIONAL DATABASE

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## BACKGROUND:

- Multiple sclerosis (MS) is an acquired, inflammatory and immune mediated disorder of the central nervous system characterized by inflammation, demyelination and degeneration of neurons. It affects about 2 million persons worldwide and from 350,000 to 450,000 in the United States<sup>1,2</sup>.
- Several studies have reported that patients with MS have difficulty maintaining employment due to the disease<sup>3</sup>.
- Only limited data are available on the effect of different disease-modifying therapies (DMTs) on indirect costs due to sick leave among employed individuals treated for MS.
  - Annual sick-leave ranges among the DMTs were recently reported as<sup>4</sup>:
- Costs: \$523 to \$1431 (in 2007, US \$).
- Absenteeism: 2.98–8.13 days.
- Avonex users had significantly lower sick-leave costs (\$445,  $P=0.0469$ ) and significantly fewer sick-leave days (4.2 days,  $P=0.0101$ ) compared with Copaxone.
  - Prior research<sup>4</sup> has not examined costs or absences in the time period before—or assessed if patients were better or worse after initiating DMT.
  - Long-term post-marketing studies report that treatment with DMTs that have less frequent administration increases adherence and reduces relapse rates<sup>5</sup>.
  - While efficacy data of the DMTs exist, limited objective data are available on the impact on medical costs and health service utilization among employed individuals with MS in the periods before and after the initiation of therapy.

## OBJECTIVE:

- To assess changes in indirect costs and absences due to sick leave among employees treated with DMTs for MS.

## METHODS:

- A healthcare claims database of US employees from 2001-2008 was used to identify patients with MS (2 DMT prescriptions or a DMT prescription and an MS diagnosis.
  - International Classification of Diseases-9 (ICD-9) codes were used to identify subjects with MS (ICD-9 code of 340.XX).
- Costs associated with absenteeism were based on sick leave data recorded by employers.

- Employees with at least a 6-month history before DMT initialization and 6-months follow-up data were included in the analysis.
- A retrospective analysis was performed using patient claims data (1/1/2001 to 6/30/2008) from the Human Capital Management Services (HCMS) Research Reference Database consisting of approximately 670,000 employees representative of the US Employed Civilian Labor Force (2004).
- Employer insurance claims records were analyzed for medical costs and health service utilization.
- 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.
- Patients with available prescription claims for a DMT were examined in the six months before and after their initial prescription (index date).
- Costs were inflation adjusted to 2008 dollars.

## Statistical Analysis

- Demographic differences were compared using *t*-tests for continuous variables and chi-square tests for discrete variables.
- T*-tests were used to compare before, after, and changes in indirect costs and absenteeism between and within DMT groups.
- Differences were considered significant at  $P<0.05$ .

## RESULTS:

- Data from 153 employees using DMTs were identified; 76 employees (35=Avonex=Interferon [IFN]- $\beta$ 1a-IM; 12=Betaseron=(IFN- $\beta$ 1b); 19=Copaxone=glatiramer acetate; 10=Rebif=IFN- $\beta$ 1a-SC) were identified as eligible for sick leave and included in the analysis (Table 1).
- No significant differences existed between cohorts in age, gender, certain job-related variables, and pre-period Charlson Comorbidity Index.
- Cost Comparisons (Table 2)
  - Before treatment initiation: Avonex users had the highest indirect costs (\$1172) compared to Betaseron (\$765), Copaxone (\$476) and Rebif (\$341).

- In the 6 months following treatment initiation, Avonex users had a larger indirect cost reduction (Figure 1: 60.5%, \$709 decrease to \$464,  $P<0.05$ ) than Betaseron (46.7%, \$357 decrease to \$408), while indirect costs increased for Copaxone (65.5%, \$311 increase to \$788) and Rebif (37.1%, \$126 increase to \$467).
- The differences in cost changes between Avonex vs. (Copaxone and Rebif); and Betaseron vs. (Copaxone and Rebif) were significant.
- Lost time (Absence) Comparisons (Table 3/ Figure 2)
  - Only Avonex users had a reduction in absenteeism (from 5.6 to 4.3 days), while absenteeism increased for Betaseron (3.4 to 4.3 days), Copaxone (2.3 to 4.3 days) and Rebif (1.9 to 6.7 days).
  - The increase in days absent for Copaxone was significant when compared with Betaseron's increase ( $P=0.0105$ ) and Avonex's decrease ( $P=0.0235$ ).

## LIMITATIONS:

- While this study adds to the body of evidence about health benefit costs among employees with MS treated with DMTs, the study has the same limitations characteristic of database studies using administrative claims, i.e., lack of severity classification, MS stage or type, and may not be representative of MS patients who are not diagnosed, who are not treated, who are treated with other therapies, or not able to maintain employment. Furthermore, the small sample size suggests that results may be interpreted with caution. Despite such limitations, the study attempted to control for confounding factors by using a pre/post study design where each employee was his own control, and thus represents an important addition to the literature.

## CONCLUSIONS/ RELEVANCE:

- Among employees treated with DMTs for MS, Avonex users had a significantly greater reduction in indirect costs and fewer absences after therapy initiation.
- Avonex's once a week dosing regimen may result in increased adherence that yielded better outcomes.
- These real-world differences suggest that Avonex patients may have greater reductions in disability than employees treated with other DMTs.

**Table 1:** Demographics of Employees treated with different DMTs with Sick Leave Benefit Eligibility

Variable	Employees with Avonex Treatment (N=35) Mean (S.E.) or Percent	Employees with Betaseron Treatment (N=12) <sup>a</sup> Mean (S.E.) or Percent	Employees with Copaxone Treatment (N=19) Mean (S.E.) or Percent	Employees with Rebif Treatment (N=10) Mean (S.E.) or Percent
Age (at index date)	41.89 (1.38)	43.00 (2.46)	42.48 (2.45)	40.16 (3.15)
Tenure (at index date)	8.48 (1.25)	12.33 (1.77)	7.24 (1.86)	8.84 (1.94)
Annual Salary	\$51,944 (\$4,3986)	\$56,338 (\$6,832)	\$51,206 (\$5,562)	\$45,392 (\$6,492)
Female	62.86%	50.00%	63.16%	80.00%
Married	54.29%	83.33%	68.42%	70.00%
Not Married	42.86%	16.67%	31.58%	30.00%
Missing Marital Status	2.86%	0.00%	0.00%	0.00%
White	62.86%	75.00%	63.16%	70.00%
Black	17.14%	25.00%	10.53%	10.00%
Hispanic	5.71%	0.00%	15.79%	20.00%
Other	0.00%	0.00%	0.00%	0.00%
Race Missing	14.29%	0.00%	10.53%	0.00%
Exempt	37.14%	50.00%	31.58%	20.00%
Full Time	88.57%	91.67%	100.00%	80.00% <sup>b</sup>
Charlson index	0.400 (0.137)	0.583 (0.229)	0.368 (0.137)	0.400 (0.267)

S.E.=Standard Error; <sup>a</sup> N=11 for Salary; <sup>b</sup>  $P<0.05$  vs Copaxone

**Table 2:** Indirect Costs Due to Sick Leave by DMT

	Employees with Avonex Treatment	Employees with Betaseron Treatment	Employees with Copaxone Treatment	Employees with Rebif Treatment
Eligible Employees (N)	35	12	19	10
Pre-period Indirect Costs (\$)	1172	765	476	341
Post-period Indirect Costs (\$)	464	408	788	467
Indirect Costs Change (\$)	-709 <sup>a</sup>	-357 <sup>b</sup>	312	126
<i>P</i> -value within	0.0468	0.0613	0.0598	0.3441

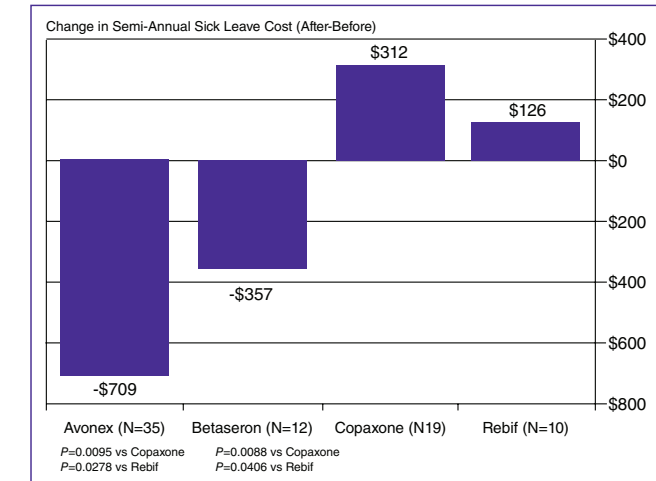
<sup>a</sup> $P=0.0095$  vs Copaxone and  $P=0.0278$  vs Rebif; <sup>b</sup> $P=0.0088$  vs Copaxone and  $P=0.0406$  vs Rebif

**Table 3:** Absence Days Due to Sick Leave by DMT

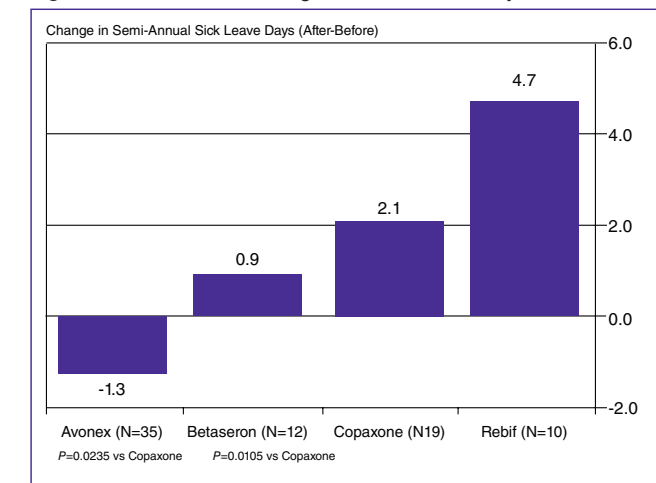
	Employees with Avonex Treatment	Employees with Betaseron Treatment	Employees with Copaxone Treatment	Employees with Rebif Treatment
Eligible Employees (N)	35	12	19	10
Pre-period Absence time (days)	5.60	3.41	2.25	1.93
Post-period Absence time (days)	4.34	4.34	4.32	6.65
Absence time Change (days)	-1.26 <sup>a</sup>	0.93 <sup>b</sup>	2.08	4.73
<i>P</i> -value within	0.1581	0.0625	0.0716	0.2560

<sup>a</sup> $P=0.0235$  vs Copaxone; <sup>b</sup> $P=0.0105$  vs Copaxone

**Figure 1:** Indirect Sick Leave Cost Change by DMT



**Figure 2:** Absence Time Change Due to Sick Leave by DMT



## References

- Joy JE, Johnston RB, eds. Multiple Sclerosis: Current Status and Strategies for the Future Committee on Multiple Sclerosis. Washington, DC: National Academy Press, 2004. Available in part at: [http://books.nap.edu/execsumm\\_pdf/10031.pdf](http://books.nap.edu/execsumm_pdf/10031.pdf). Accessed March 3, 2008
- National MS Society. Just the Facts. Frequently asked questions about MS and the National MS Society. Available at <http://www.nationalmssociety.org/about-multiple-sclerosis/FAQs-about-MS/index.aspx#top>. Accessed March 10, 2008
- Roessler RT, Rumrill PD Jr, Hennessey ML, Vierstra C, Pugsley E, Pittman A. Perceived strengths and weaknesses in employment policies and services among people with multiple sclerosis: results of a national survey. *Work*. 2003;21(1):25-36.
- Brook RA, Rajagopalan K, Kleinman NL, Melkonian AK. Absenteeism and Health Benefit Costs Among Employees with Multiple Sclerosis. *Curr Med Res Opin*. May 2009;25(6):1469-76.
- Reynolds MW, Seaman C, Rajagopalan K, Roth E. Real-World Assessment of Patient Adherence and Treatment Discontinuation Among Different Treatments for Multiple Sclerosis. Presented as poster #168, ECTRIMS, October 11-14, 2007, Prague, Czech Republic.