

# SEVERITY OF ILLNESS AMONG PERSONS WITH MULTIPLE SCLEROSIS: AN ANALYSIS OF COST QUINTILES

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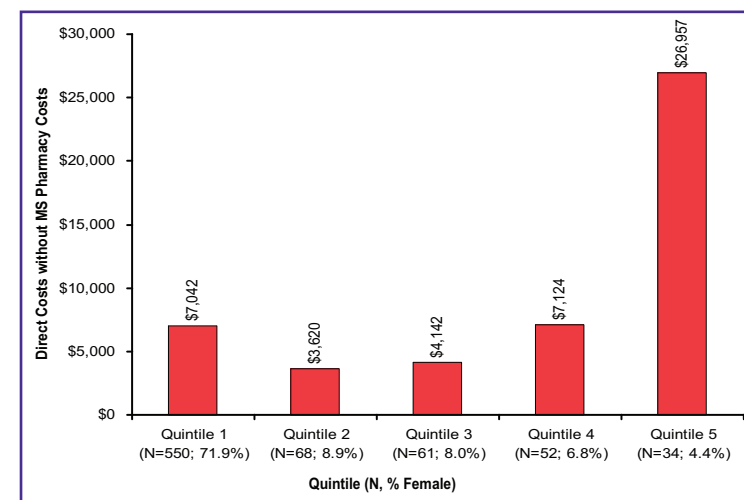
## INTRODUCTION:

- 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 in the United States.<sup>1,2</sup>
- In clinical studies, MS severity is often measured by the Expanded Disability Status Scale (EDSS),<sup>3</sup> the MS Functional Composite Measure (MSFC),<sup>4</sup> or the Functional Assessment of Multiple Sclerosis (FAMS).<sup>5</sup>
- Unfortunately, most administrative claims data do not contain severity measures.
- We explored whether disease-specific cost (DSC) quintiles may be indicative of disease severity in an examination of MS. These quintiles were based on the Pareto Principle:
  - Vilfredo Pareto was an economist who is credited with establishing what is now widely known as the Pareto Principle or 80/20 rule that costs or resources will be maldistributed within a population such that 20% of the population consumes 80% of the costs.
- As a proxy for severity of illness, we wanted to test what percent of the population incurred the top 20% of disease specific costs.

## METHODOLOGY:

- The employees included in this research project came from the Human Capital Management Services Research Reference Database (HCMS RRD).
- Data for these employees come from multiple large employers that are widely dispersed throughout the United States and

Figure 1: Direct Costs without MS Pharmacy Costs by Quintile



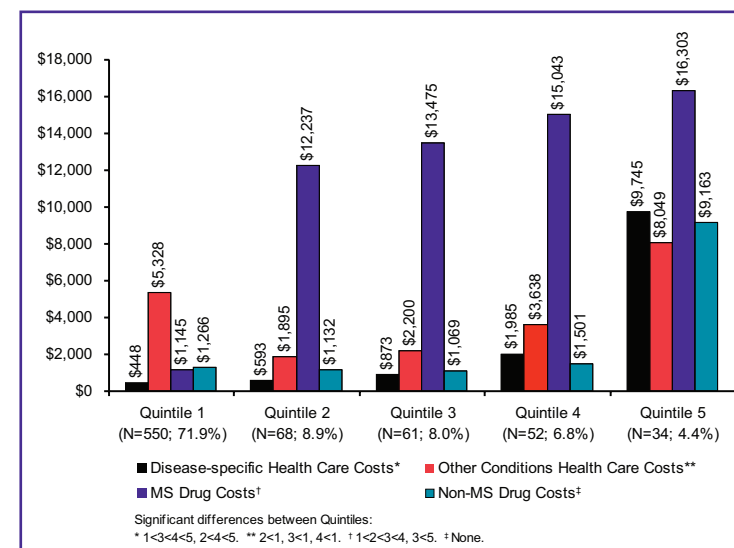
represent the retail, service, manufacturing, and financial industries.

- Employees with Multiple Sclerosis were identified with a primary, secondary, or tertiary diagnosis using the International Classification of Diseases, 9th Revision diagnostic codes for Multiple Sclerosis (ICD-9=340.xx).
- Annual Disease-Specific Costs (DSC) were calculated as the sum of the:
  - Disease-Specific Medical Costs for services associated with the disease-specific ICD-9 codes and the
  - Disease-Specific Prescription Costs for outpatient disease-modifying therapies (DMTs):
    - Avonex [IFN-β1a IM];
    - Betaseron [IFN-β1b];
    - Copaxone [glatiramer acetate]; and
    - Rebif [IFN-β1a SC].
- Employees with MS were rank ordered into 5 cost quintiles based on DSC (20% of DSC in each) ranging from lowest to highest cost.
- Pairwise differences in the quintile distributions were assessed using Chi-squared ( $\chi^2$ ) tests.

## RESULTS:

- Total Employees with MS: 765
- Therapy utilization by Quintile (Table 1).
- Looking at only the MS Specific Medical and MS and Other Prescription Drug Costs (Figure 1) indicates possible comorbid issues in Quintile 1.

Figure 2: MS-Specific and Other Condition Medical and Prescription Cost by Quintile



- The MS Specific and Other Condition Medical and Prescription Drug Costs by Quintile are presented in Figure 2.
- Indirect Costs of Employees with MS by Quintile (Table 2).
- Productivity of Employees with MS by Quintile (Table 3).

## CONCLUSIONS:

- Disease-Specific Costs are extremely maldistributed—the top Quintile of expenditures was incurred by only 4.4% of the population.
- Employees in the top Quintile had the highest total health benefit costs.
- Employees in the lowest Quintile were least likely to receive MS-specific prescription drug therapies.
- These comparisons may suggest that cost quintiles could be indicative of severity in MS. Further investigation is warranted over an extended period of time to confirm this relationship.
- Untreated Employees with MS in Quintile 1 (the majority of Quintile 1) may have higher comorbid medical costs than with those receiving proper MS treatment; possibly due to symptomatic treatment of comorbid symptoms than treating the underlying disease. These results may be suggestive of the important need for early and appropriate treatment of MS with DMTs and warrants further investigation.

## References

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	Quintile 1 (N=550)	Quintile 2 (N=68)	Quintile 3 (N=61)	Quintile 4 (N=52)	Quintile 5 (N=34)	Significant Quintile Differences <sup>1</sup>
% of Quintile using any DMT Therapy	18.0%	100.0%	100.0%	100.0%	91.2%	all>1, 2>5, 3>5, 4>5

<sup>1</sup>Differences are considered significant if  $P < 0.05$  based on chi-square tests.

	Quintile 1 (N=550)	Quintile 2 (N=68)	Quintile 3 (N=61)	Quintile 4 (N=52)	Quintile 5 (N=34)	Significant Quintile Differences <sup>2</sup>
Workers' Compensation Metrics (Eligible N)	(N=520)	(N=59)	(N=59)	(N=52)	(N=33)	
Workers' Compensation Medical Cost	\$298	\$80	\$62	\$0	\$0	4<1, 5<1
Workers' Compensation Disability Cost	\$288	\$59	\$0	\$0	\$0	
Sick Leave Metric (Eligible N)	(N=266)	(N=29)	(N=27)	(N=27)	(N=9)	
Sick Leave Cost	\$636	\$712	\$837	\$1,862	\$1,237	
Short-Term Disability Metric (Eligible N)	(N=298)	(N=27)	(N=34)	(N=36)	(N=21)	
Short-Term Disability Cost	\$1,304	\$67	\$487	\$1,590	\$1,508	2<1
Long-Term Disability Metric (Eligible N)	(N=420)	(N=49)	(N=48)	(N=41)	(N=23)	
Long-Term Disability Cost	\$366	\$0	\$314	\$1,453	\$0	

<sup>1</sup> For employees with treatment, the index date is the date of the first MS prescription. For those without, it is the average date from those treated.

	Quintile 1 (N=550)	Quintile 2 (N=68)	Quintile 3 (N=61)	Quintile 4 (N=52)	Quintile 5 (N=34)
Productivity Metrics (Eligible N)	(N=24)	(N=3)	(N=2)	(N=0)	(N=1)
Units processed / hour worked	15.92	16.50	14.54		6.40
Units processed / year	23,248	29,009	22,832		7,942

None of the productivity differences between cohorts were significant.  
<sup>2</sup> Differences are considered significant if  $P < 0.05$

