

# Work Productivity and Financial Impacts of Multiple Sclerosis in Sweden: A Nationwide Register-based Longitudinal Study

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## INTRODUCTION

- Multiple sclerosis is a progressive, disabling neurological condition that impacts a patient's work productivity with significantly higher rates of sickness absence and decreased work hours due to increasing fatigue, depression and anxiety.<sup>1</sup>
- Due to uncertainty of the progression of disease, multiple sclerosis may exert substantial financial strain on patients and affects their quality of life.<sup>2</sup>
- Limited studies have evaluated that multiple sclerosis impacts on work productivity using population level data.<sup>3</sup>

## OBJECTIVE

To assess population-level employment status, sickness absence and earned income among patients with multiple sclerosis in Sweden.

## METHODS

### Data Source

- Data were collected from four national registers provided by the National Board of Health and Welfare in Sweden, including
  - National Patient Register: diagnoses, procedures, hospitalizations, and outpatient services in specialist care.
  - Prescribed Drug Register: dispensed items, amount, and date of filled prescription.
  - Cause of Death Register: date and cause of death.
  - Socioeconomic characteristics have been obtained from Longitudinal Integrated Database for Health Insurance and Labor Market Studies (LISA).
- Data from Swedish national registers were linked through the unique personal identity number.

### Study Patients

- Patients with  $\geq 1$  diagnosis of multiple sclerosis (ICD-10 G35) were selected from January 1, 2001 to December 30, 2017.
  - Index date: Date of first diagnosis of multiple sclerosis.
  - Baseline: 12-month period prior to the index date.
  - Follow-up: time from index date to date of death or the end of the study period.
- Patients with index date coinciding with death date or censoring date were excluded.

### Study Measures

- Demographics were assessed at index and comorbid conditions were reported for baseline period.
- Work productivity outcomes such as employment status, sickness absence (percentage and duration), and income were evaluated for working-age patients (i.e., aged 18-65 years) with at least 1-year post-index follow-up for a maximum of 16 years.
- Income was adjusted to 2018 using labor cost index.

### Statistical Analyses

- All data analyses were conducted using R using SAS 9.4 (SAS Institute, Cary NC), and R version 4.1.1.
- Means, standard deviation (SD), medians and interquartile ranges (IQR) were reported for continuous variables; frequency and percentage were reported for categorical variables.

## RESULTS

### Sociodemographic Characteristics of Patients with Multiple Sclerosis

- 26,219 patients with multiple sclerosis were identified, with mean (SD) age 46.3 (15.4) years; 68.9% were women (Table 1).
- Most frequent comorbidities at baseline were demyelinating diseases of central nervous system (9.6%), optic nerve and visual pathways disorders (7.0%), and visual disturbances and blindness (4.6%).

Table 1: Baseline characteristics of Swedish patients diagnosed with Multiple Sclerosis (ICD-10 G35) between January 1, 2001 and December 30, 2017

	Overall (N=26219)
Sex, Women	18076 (68.9%)
Age, mean (SD), years	46.3 (15.4)
<18	283 (1.1%)
18-45	12737 (48.6%)
46-65	10109 (38.6%)
Education, N %	
Not completed compulsory education (< 9 yrs)	2418 (9.2%)
Completed compulsory education (9 yrs)	2823 (10.8%)
Upper secondary (2-3 yrs)	11690 (44.6%)
College/university	8244 (31.4%)
Research education	220 (0.8%)
Comorbidities at baseline*, N %	
Demyelinating diseases of the central nervous system	2506 (9.6)
Disorders of optic nerve and visual pathways	1827 (7.0)
Visual disturbances and blindness	1206 (4.6)

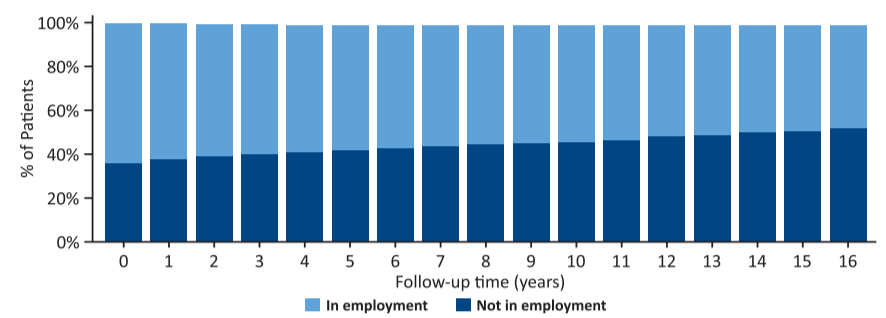
All Values expressed as n (%) unless mentioned otherwise. \*defined using ICD-10.3- indicating general category SD, standard deviation; yrs, years

### Employment, Sickness Absence and Income of Working-age Multiple Sclerosis Patients

- Of the identified multiple sclerosis patients, 21,602 patients were aged 18-65 years and had at least 1-year post-index follow-up.
- Employment rates declined over time with 62.3% (n=13,459/21,602) employed at 1-year, 53.6% (n=5,225/9,741) employed at 10-years and 47.16% (n=1,119/2,373) employed at 16-years.

## RESULTS (Cont.)

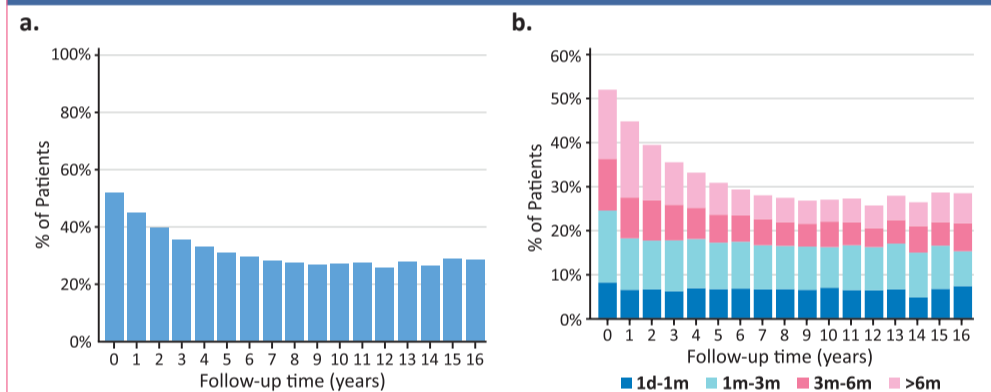
Figure 1: Proportion of multiple sclerosis patients (ages 18-65 yr) with employment status by follow-up year over the study period 1 January, 2001 to 30 December, 2017



0= index year, yr, years

- Among the employed patients at year 1 (n=13,459), 44.8% reported sickness absence and 26.5% reported sickness absence of  $\geq 3$  months.
- While the rate of patients reporting sickness absence declined over time (fig 2a) due to declining employment rates (fig 1), the duration of sickness absence was consistent over time (fig 2b).

Figures 2a and b: Proportion of multiple sclerosis patients who reported sickness absence and duration of sickness absence over the study period 1 January, 2001 to 30 December, 2017



0= index year, d, day; m, months

- Income declined over time with median annual earned income (interquartile range) at year 1 as €21,305 (€0, €35,106.49), at year 10 as €11,837.50 (€0, €32,900.78) and at year 16 as €1,054.95 (€0, €29,393.61).

### Strengths

- This study used national population-level registers, allowing for completeness and accuracy of the linkage, and assessed the outcomes and socioeconomic factors among patients with multiple sclerosis within a long observation period.
- Results are generalizable to Sweden and Nordic regions with similar demographic characteristics, as all the patients are treated in public hospitals in Sweden.

### Limitations

- Primary healthcare data are still not reported on a national level; therefore, there is lack of information on primary care diagnosis and early treatment.
- Results may not be generalizable outside the Nordic region despite similar health care system due to inherent differences in demographic characteristics; nevertheless the study provides directional insights on work productivity outcomes.

## CONCLUSIONS

- Multiple sclerosis imposes a substantial work productivity loss with financial consequences to the patients, employers, and the society, as a whole, in Sweden.
- Overall management to multiple sclerosis must aim to not only reduce disability and associated symptoms, but also help improve patients' overall work productivity.

### References

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### Disclosure

Qian Cai, Michele Cole, Kavita Gandhi, Lilla Di Scala, Shane Kavanagh are employees of Janssen Global Commercial Strategy and may hold stock or stock options in Johnson & Johnson. Nurgul Batyrbekova is an employee of SDS Life Science.