BURDEN OF MULTIPLE SCLEROSIS IN GERMANY – A MATCHED COHORT STUDY USING A LARGE CLAIMS DATABASE

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OBJECTIVES

- Multiple sclerosis (MS) is the most common neurological disorder of young adults in Germany [1].
- MS is associated with significant medical, social and economic consequences. In addition to the burden for the affected patients, the societal impact of MS is considered high due to the early onset of the disease and the resulting loss of productivity, the long-lasting need for assistance in daily activities, and intensive multi-disciplinary healthcare utilization [2].
- Aim of this study was to assess the epidemiology of MS and to describe the healthcare resource utilization and costs for patients with MS compared to a population without MS from a statutory health insurance (SHI) perspective.

METHODS

- This was a retrospective, matched cohort study conducted from the SHI perspective.
- The underlying database was a large German sickness fund (DAK-Gesundheit) with about 5 million covered lives.
- Prevalent MS patients in 2013 were identified using the ICD-10-GM code G35.- from 2010 to 2013 by
  a) one inpatient diagnosis or
  b) one verified outpatient diagnosis secured by a second outpatient verified diagnosis within the subsequent four quarters or
  c) one verified outpatient diagnosis secured by a prescription for a MS specific drug up to four quarters after the diagnosis quarter.
- Incident MS patients in 2013 were drawn from the prevalent patients by excluding those with an inpatient or outpatient MS diagnosis or a prescription for a MS specific drug from 2010 to 2012.
- The prevalent MS patients were matched to individuals without any MS diagnosis from 2010 to 2013 using an exact, direct matching approach with a 1:1 ratio.
- Matching parameters included age, gender, state of insurance, Elixhauser Comorbidity Index[1] [3], federal state, residence in urban/rural areas[2] [4].
- Patient characteristics, healthcare resource consumption and healthcare costs were determined for 2013.
- Statistical differences between the matched cohorts were assessed with the paired t-test, Wilcoxon signed-rank test, chi-squared test or McNemar test.
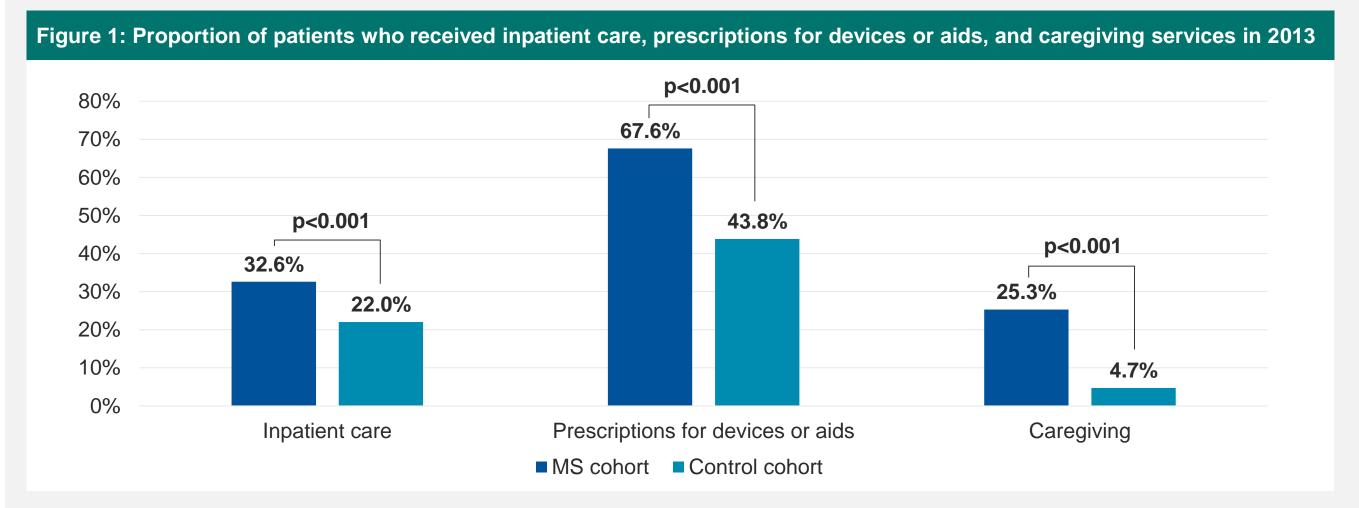
RESULTS

Prevalence and Incidence

- In 2013, 24,150 prevalent MS patients were identified in the DAK-Gesundheit claims database.
- The age- and gender-adjusted prevalence rate was 416.6 per 100,000 individuals.
- Extrapolated to the German population, 335,440 patients suffered from MS in 2013.
- Of the prevalent MS patients, 4.8% were identified as incident in 2013 (n=1,169 patients).
- The age- and gender-adjusted incidence rate was 22.0 per 100,000 individuals.
- The extrapolation resulted in 17,691 patients newly diagnosed with MS in the German population in 2013.
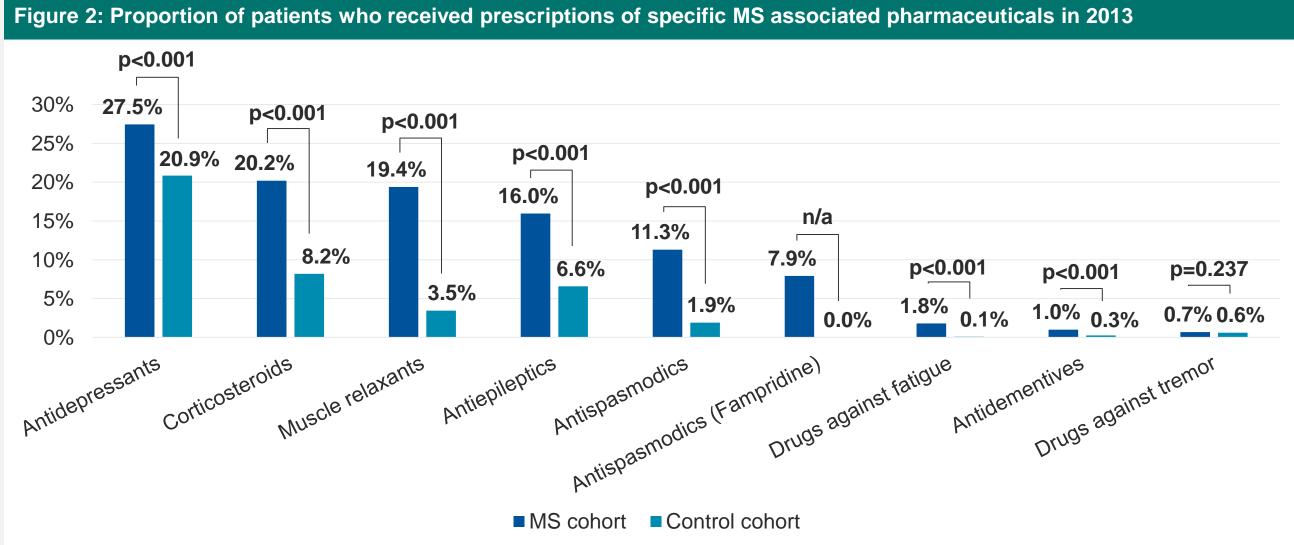
Matching and Patient Characteristics

- A matching partner was available for 93.1% of the prevalent MS patients (n=22,492 patients).
- Most of the matched patients were female (80.3%). The mean age was 52.7 years (±13.6 years).
- 58.5% of the matched patients were retired, 38.0% were listed as members (working population), and 3.5% were family insured (non-working spouses and children).
- Most of the matched patients lived in urban areas (82.7%), whereas 17.3% lived in rural areas.
- In 2012, 26.6% of the matched patients had an Elixhauser Comorbidity Index score of 0, 31.5% had a score of 1, 21.9% had a score of 2, 10.9% had a score of 3, and 9.1% had a score of ≥4.

Healthcare Resource Consumption

- Differences in healthcare consumption between the MS cohort and the matched control cohort without MS were most notable in the sectors inpatient care, devices and aids, and caregiving **(Figure 1)**.

Figure 1: Proportion of patients who received inpatient care, prescriptions for devices or aids, and caregiving services in 2013
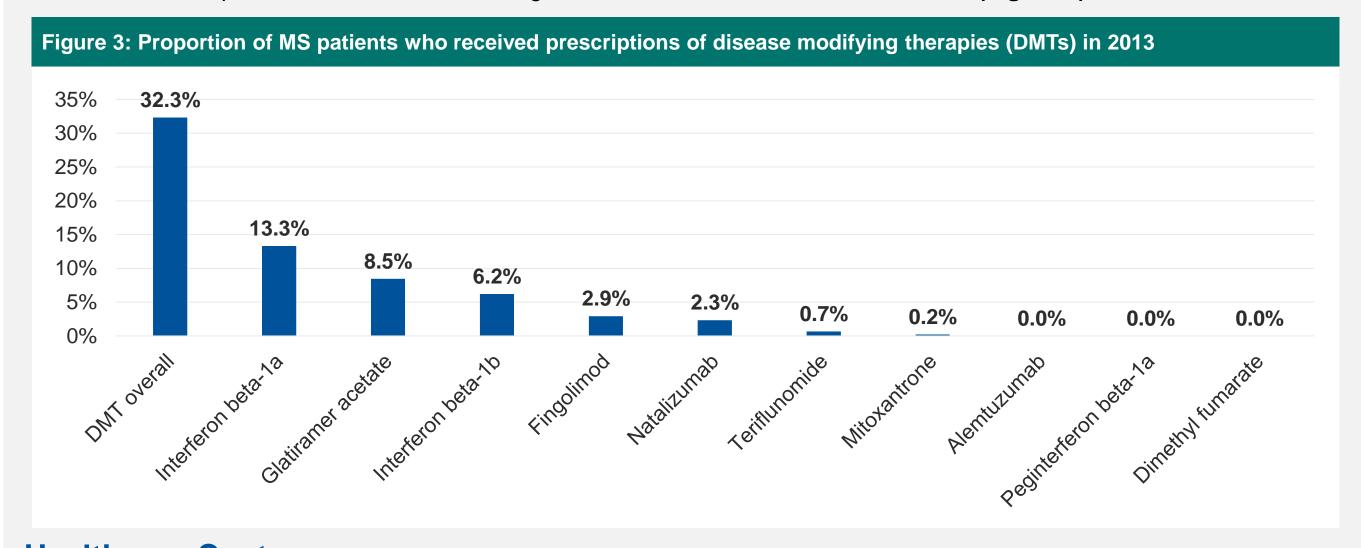
- The main reason for the MS patients to be hospitalized was MS. For 68.7% of the hospitalized patients the primary diagnosis was MS, followed by other disorders of the urinary system (3.7%) and epilepsy (2.1%).
- The most often prescribed devices in the MS cohort with a significant difference to the control cohort included devices for incontinence (18.2% vs. 2.1%, p<0.001) and vehicles such as wheelchairs (13.9% vs. 0.7%, p<0.001).
- Aids including physical therapy (55.9% vs. 29.1%, p<0.001), occupational therapy (9.4% vs. 1.9%, p<0.001), and speech therapy (2.7% vs. 0.7%, p<0.001) were also prescribed to more patients in the MS cohort than in the control cohort.
- Until 2017, patients requiring caregiving in Germany were assigned to three care levels, from level 1 for minor impairments to level 3 for major impairments. Most of the MS patients were assigned to care level 2 (39.4% of all assigned care levels) whereas most of the patients in the control cohort were classified as care level 1 (54.1% of all assigned care levels).
- An analysis of specific MS associated pharmaceuticals showed that more patients from the MS cohort than from the control cohort received prescriptions for corticosteroids, antidepressants, muscle relaxants, antiepileptics, and antispasmodics **(Figure 2)**.

Figure 2: Proportion of patients who received prescriptions of specific MS associated pharmaceuticals in 2013
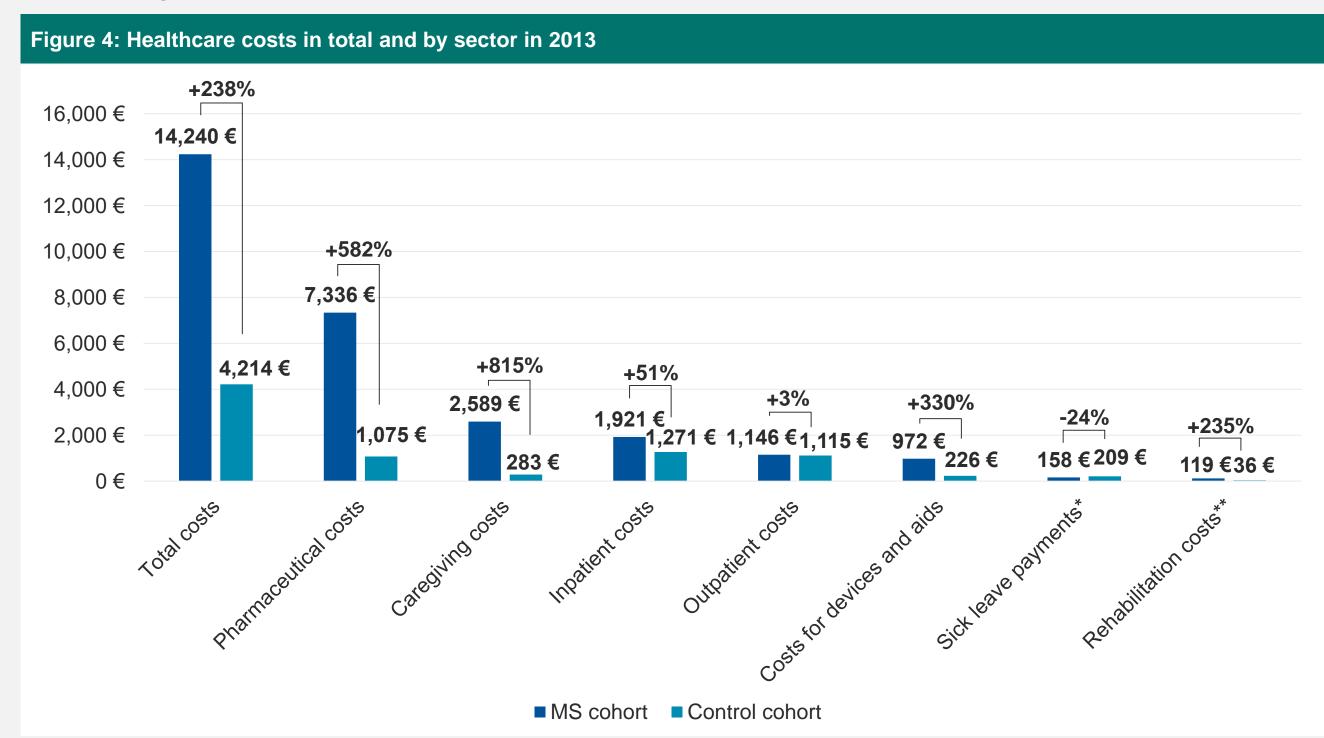
n/a: not applicable due to 0.0% in the control cohort

- About one third (32.3%) of the MS patients received at least one prescription for a disease-modifying therapy (DMT) in 2013.
- DMTs included in particular interferon beta-1a, glatiramer acetate, and interferon beta-1b **(Figure 3)**.

Figure 3: Proportion of MS patients who received prescriptions of disease modifying therapies (DMTs) in 2013

Healthcare Costs

- The total costs from the SHI perspective were €14,240 per MS patient and €4,214 per control group patient (p<0.001) in 2013.
- Hence, the average MS patients incurred increased healthcare costs of €10,026 (+238%) when compared to the average control group patient.
- The difference was mainly due to medication costs (€7,336 vs. €1,075, p<0.001) and care-giving expenses (€2,589 vs. €283, p<0.001) **(Figure 4)**.

Figure 4: Healthcare costs in total and by sector in 2013

*Limitation: Sick leave payments are dependent on the respective salary. **Limitation: The SHI only covers a part of the rehabilitation costs.

CONCLUSIONS

- This was a retrospective, matched cohort study conducted from the SHI perspective.
- The annual age and gender-adjusted prevalence of 416.6 MS patients per 100,000 individuals determined in this study in 2013 was considerably higher than described in the literature. Results from previous studies ranged from 289 to 350 MS patients per 100,000 individuals in Germany [5-7].
- The age and gender-adjusted incidence for Germany was reported to lie between 7 and 22 newly diagnosed MS patients per 100,000 individuals per year [5,8]. The incidence from this study was estimated at the upper bound of that range in 2013 (22.0 MS patients per 100,000 individuals).
- The age and gender distribution of the prevalent MS patients was in line with results from other studies [7,9].
- The healthcare resource consumption of MS patients was significantly increased when compared to the matched control cohort without MS, in particular for the sectors inpatient care, devices and aids, and caregiving.
- This was partially reflected in the healthcare costs. The mean annual costs per MS patient were increased by 238% when compared to the control cohort. This difference in healthcare costs mostly resulted from increased caregiving (+815%) and pharmaceutical (582%) costs.
- This study emphasizes the burden of MS on the individual patient and society. Patients suffer from premature impairments and require a multi-sector treatment approach. This leads to high direct healthcare costs for the society in addition to indirect costs from the loss of productivity which was not evaluated in this study.
- The results imply that the treatment of MS patients needs to start early and should be improved to lower disease activity and prevent progression. This might also potentially reduce the healthcare costs.

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FOOTNOTES

[1] The Elixhauser Comorbidity Index is a method to categorize comorbidities of patients based on ICD codes. MS was excluded from these ICD codes.
[2] Urban/rural areas were assessed via the INKAR dataset of the German Federal Institute for Research on Building Urban Affairs and Spatial Development.