Treatment patterns and healthcare resource utilization among patients with multiple sclerosis in Germany treated with nabiximols between 2010-2020

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Background

- Multiple sclerosis (MS) is a chronic inflammatory demyelinating disorder of the central nervous system, affecting approximately 2.8 million people globally and over 250,000 in Germany alone[1]
- Spasticity is an involuntary increase in muscle tone, occurring in up to 84% of patients with MS[2–4]
- MS-related spasticity is associated with mobility impairment, spasms, pain, fatigue, bladder and bowel dysfunction, and other difficulties[4–6]
- Nabiximols is approved for symptom improvement in adult patients with moderate to severe spasticity due to MS who have not responded adequately to other anti-spasticity medication (ASM) in multiple countries outside the United States
- There is a need to assess real-world treatment patterns, healthcare resource utilization (HRU), and costs associated with nabiximols

Objectives

1. To describe the treatment patterns of patients with MS prior to and after receiving nabiximols treatment
2. To estimate HRU and costs for patients with MS treated with nabiximols and other ASMs

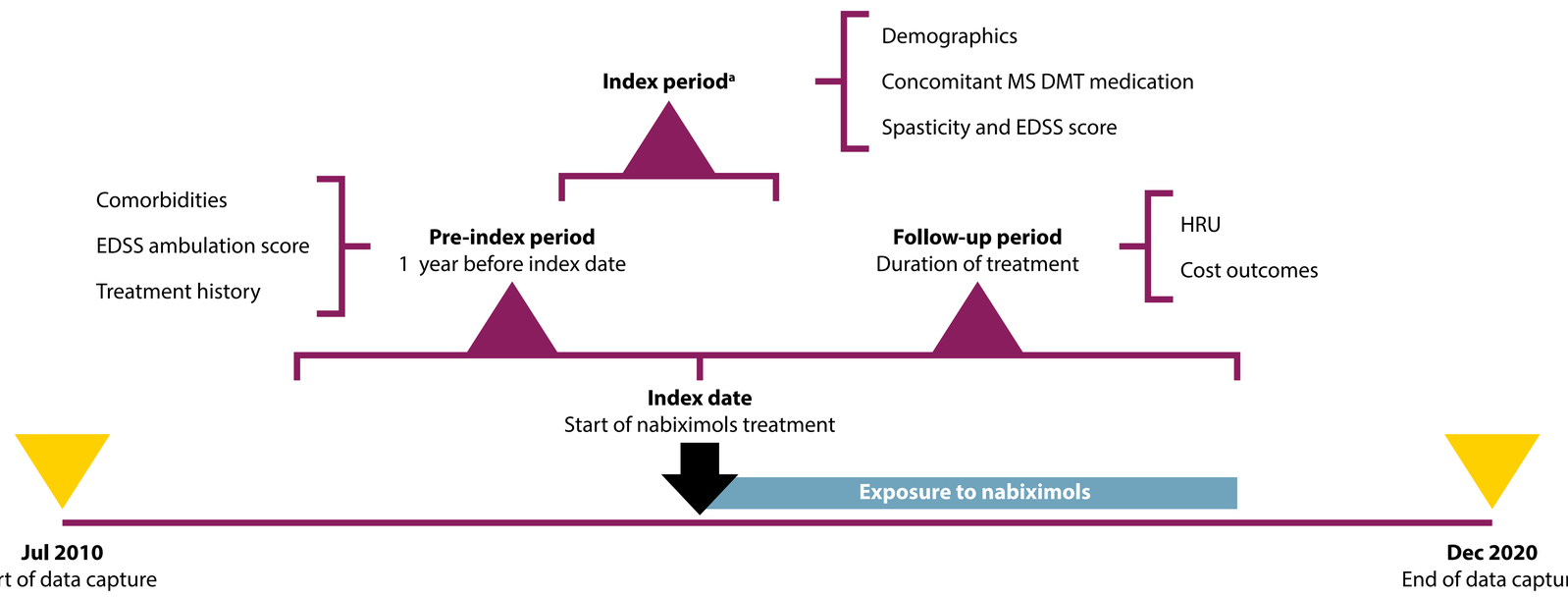
Methods

- This retrospective, non-interventional, comparative cohort study of patients with MS in Germany used secondary clinical data extracted from the NeuroTransData (NTD) registry
- Inclusion criteria consisted of ≥1 diagnosis of MS and ≥1 nabiximols dispensation on or after 01 July 2011. Patients with a nabiximols start date after their last visit date were excluded
- Patients were followed from July 2010 until December 2020, and the index date was defined as the start of nabiximols treatment (**Figure 1**)
- A control group consisting of patients treated with an ASM that was not nabiximols was created to compare HRU and cost outcomes with patients treated with nabiximols. Propensity score matching on key variables (e.g., age, sex, Expanded Disability Status Scale [EDSS] score [overall and ambulation], duration of disease from first diagnosis, MS subtype, and previous ASMs) was performed on a 1:1 basis
- Descriptive statistics were used to summarize patient characteristics and ASM patterns prior to and after receiving nabiximols (**Figure 2**)
- HRU (estimated using negative binomial regression) and costs (estimated using linear regression) were calculated per patient as the total number of events or costs divided by the duration of the treatment episode. Results are presented for the full cohort and for a subset of patients with ≥8 weeks of nabiximols exposure (to exclude outliers with very short treatment exposure) (**Table 2**)

Results

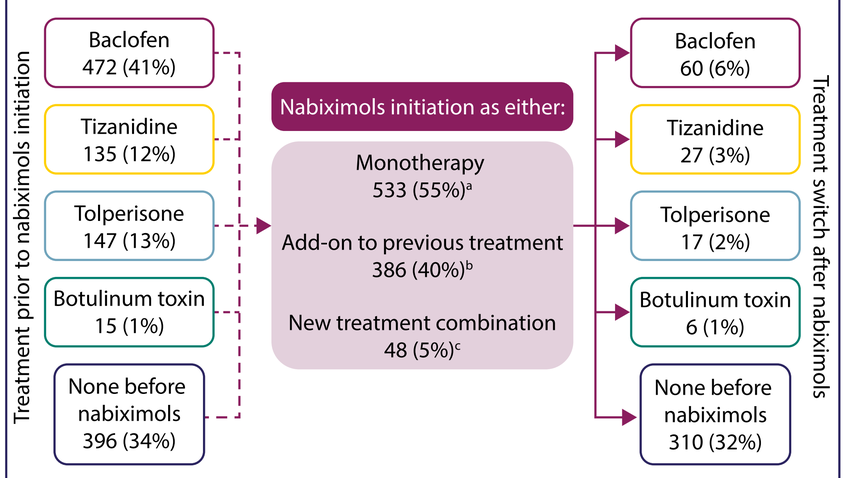
- The mean age in the full cohort (N=967) was 51 years. Most patients were female (63%), and 52% had progressive MS (**Table 1**)
- Individual modified Ashworth Scale (MAS) scores were determined by the highest score of all muscles tested on the patient and were available for a subset of the cohort (n=307). The median MAS score in patients with relapsing-remitting MS (RRMS), primary progressive MS (PPMS), and secondary progressive MS (SPMS) were 2, 4, and 4, respectively
- All HRU endpoints were numerically lower in the nabiximols group compared with the control group, regardless of treatment exposure (**Table 2**). Within the 8-week minimum exposure group (n=369), patients treated with nabiximols had significantly lower (each $P<0.05$) annual outpatient visits (3.0 vs 4.7), additional aid use (0.9 vs 1.5), and sick leave days (0.2 vs 0.5).
- All cost endpoints were numerically lower in the nabiximols group versus matched controls among those with a minimum of 8 weeks of treatment exposure, with significantly lower costs (each $P<0.05$) observed for annual outpatient visits (514 € vs 805 €) and sick leave (144 € vs 378 €) (**Table 2**)

Figure 1. Study design



[a]Considers the 3 months prior to and 1 month after the index date. The index period was extended to 6 months prior and 1 month after, to allow for inclusion of more co-variates needed for matching. DMT, disease-modifying therapy; EDSS, Expanded Disability Status Scale; HRU, healthcare resource utilization; MS, multiple sclerosis.

Figure 2. Treatment patterns before and after receiving nabiximols



[a]No other ASM initiated within 30 days of nabiximols initiation; [b]Other ASM initiated prior to nabiximols and not discontinued later than 30 days after initiating nabiximols; [c]Other ASM initiated within 30 days of nabiximols initiation. ASM, anti-spasticity medication.

- 34% of cases did not have a documented ASM before initiating nabiximols
- Baclofen was the most common ASM before nabiximols treatment (41%)
- Nabiximols was most often initiated as a monotherapy (55%) or as an add-on to another ASM (40%)
- 32% did not switch to other ASMs following nabiximols treatment

Table 1. Patient characteristics

Variable	NTD (N=967)
Age, mean (SD)	50.9 (10.0)
Female, n (%)	613 (63)
MS subtype	
RRMS, n (%)	450 (47)
SPMS, n (%)	375 (39)
PPMS, n (%)	121 (13)
MAS score, median (Q1, Q3)[a,b]	3 (1, 4)
EDSS, median (Q1, Q3)[c]	5.5 (4, 6.5)
Comorbidities, n (%)	
Bowel & bladder dysfunction	502 (52)
Depression & anxiety	451 (47)
Dysarthria[d]	347 (36)
Fatigue	656 (68)
Mobility impairment based on cerebellar FS	513 (53)
Mobility impairment based on pyramidal FS	656 (68)
Patients with no previous DMTs at nabiximols initiation, n (%)	469 (49)

[a]MAS is a clinical tool used to measure the increase in muscle tone and was based on the highest score of all muscles tested; [b]Information only available for Ashworth subset cohort (n=307); [c]EDSS is a measure which quantifies the disability caused by MS. Scores range from 0.0 (normal neurological functioning) to 10.0 (death due to MS). EDSS scores from 1.0 to 4.5 refer to patients with MS who are fully ambulatory, whereas scores ranging from 5.0 to 9.5 refer to patients with MS with impaired ambulation (walking); [d]Speech disorder caused by muscle weakness. DMT, disease-modifying therapy; EDSS, Expanded Disability Status Scale; FS, functional system; MAS, Modified Ashworth Scale; MS, multiple sclerosis; PPMS, primary progressive MS; RRMS, relapsing-remitting MS; SD, standard deviation; SPMS, secondary progressive MS.

Table 2. Mean annual HRU and costs for the nabiximols groups versus control group (other ASM)

	HRU					Costs (EUR)				
	No exposure limit		8-week exposure			No exposure limit		8-week exposure		
Variable	Control (n=506)	Nabiximols (n=506)	Control (n=369)	Nabiximols (n=369)	Slope	Control (n=506)	Nabiximols (n=506)	Control (n=369)	Nabiximols (n=369)	Slope
Total costs excluding medications	–	–	–	–	–	21,006	7327	5617	3213	–
Total costs of medication	–	–	–	–	–	11,938	12,434	13,269	12,656	–613.19
Outpatient visits (per year & costs)	21.3	11.9	4.7	3.0*	–0.79*	3683	2053	805	514*	–291.19*
Inpatient visits (per year & costs)	0.9	0.2	0.3	0.1	–0.98	12,959	3308	3948	2159	–1788.88
Care units (per year & costs)	4.9	3.0	1.2	0.7	–1.11	200	127	52	31	–20.93
Additional aids	8.3	2.8	1.5	0.9*	–1.15*	2464	1292	360	302	–57.74
Additional non-pharmaceutical therapies	2.8	1.7	1.0	0.8	–	207	126	73	63	–
Sick leave days	1.5	0.5	0.5	0.2*	–1.20*	1495	423	378	144*	–234.15*

*P-value <0.05 favoring nabiximols over control. Care units – house, family, ambulant and short-time care; Additional aids – crutches, wheelchairs, walker support, domestic conversions, catheter, insoles, diapers; Additional non-pharmaceutical therapies – physiotherapy, occupational therapy, speech therapy; Sick leave – direct reports or hospitalization or rehabilitation or main income from insurance. HRU, healthcare resource utilization.

Limitations

Limitations may include:

- The data available in the registry may not capture complete history of prior medications
- Though all patients in this study had MS, it was not possible to ascertain if patients who were treated with nabiximols had spasticity or if they were prescribed nabiximols primarily for the treatment of spasticity as per the local prescribing information from the European Union summary of product characteristics
- Additional evidence from other real-world data sources covering other geographies, healthcare systems, and treatment guidelines are needed to enhance generalizability

Conclusions

- Lower annual HRU and costs were associated with nabiximols versus matched controls in this real-world German registry cohort of patients with MS

References: 1. Atlas of MS. MS International Federation. Available at https://www.atlasofms.org/map/global/epidemiology/number-of-people-with-ms; 2. Hugos CL, et al. *Curr Neurol Neurosci Rep* 2019;19:79; 3. Rizzo MA, et al. *Mult Scler* 2004;10:589-95; 4. Milinis K, et al. *Mult Scler Relat Disord* 2016;5:34-9; 5. Bethoux F, et al. *Patient* 2016;9:537-546; 6. Henze T, et al. *Der Nervenarzt* 2013;84:214-22

Acknowledgements: This study was funded by Jazz Pharmaceuticals, Inc. Writing assistance was provided by Eilis Bowie, MSc, of Parexel International, and was funded by Jazz Pharmaceuticals

Disclosures: Jonatan Freilich and Mateo Delclaux Rodriguez-Rey are employees of Parexel International. Stefan Braune has received honoraria from Kassenaerztliche Vereinigung Bayern and HMOs for patient care; honoraria for consulting, project management, clinical studies, and lectures from Biogen, CSL Behring, TG Therapeutics, NeuroTransData, Novartis, Roche, and Thieme Verlag; and honoraria and expense compensation as board member of NeuroTransData. Tim Spelman received compensation for serving on scientific advisory boards, honoraria for consultancy, and funding for travel from Biogen Inc; and speak honoraria from Novartis. Samrat Yeramaneni has no financial disclosure but is a former employee of Jazz Pharmaceuticals. Caroleen Drachenberg is an employee of Jazz Pharmaceuticals and holds ownership interest in Jazz Pharmaceuticals, Inc.

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ISPOR Europe 2022; 06-09 November 2022; Vienna, Austria