Data quality evaluation for observational multiple sclerosis registries

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Abstract:	<p>Objective Objective and reproducible evaluation of data quality is of paramount importance for studies of 'real-world' observational data. Here we summarise a standardised data quality, density and generalisability process implemented by MSBase, a global multiple sclerosis (MS) cohort study.</p> <p>Methods Error rate, data density score and generalisability score were developed using all 35,869 patients enrolled in MSBase as of November 2015. The data density score was calculated across six domains (follow-up, demography, visits, MS relapses, paraclinical data, therapy) and emphasised data completeness. The error rate evaluated syntactic accuracy and consistency of data. The generalisability score evaluated believability of the demographic and treatment information. Correlations among the three scores and the number of patients per centre were evaluated.</p> <p>Results</p>

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	<p>Errors were identified at the median rate of 3 per 100 patient-years. The generalisability score indicated the samples' representativeness of the known MS epidemiology. Moderate correlation between the density and generalisability scores ($\rho=0.58$) and a weak correlation between the error rate and the other two scores ($\rho=-0.32-0.33$) were observed. The generalisability score was strongly correlated with centre size ($\rho=0.79$).</p> <p>Conclusion</p> <p>The implemented scores enable objective evaluation of the quality of observational MS data, with an impact on the design of future analyses.</p>

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Data quality evaluation for observational multiple sclerosis registries

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on behalf of the MSBase Scientific Leadership Group and MSBase Study Group*

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Abstract

Objective

Objective and reproducible evaluation of data quality is of paramount importance for studies of ‘real-world’ observational data. Here we summarise a standardised data quality, density and generalisability process implemented by MSBase, a global multiple sclerosis (MS) cohort study.

Methods

Error rate, data density score and generalisability score were developed using all 35,869 patients enrolled in MSBase as of November 2015. The data density score was calculated across six domains (follow-up, demography, visits, MS relapses, paraclinical data, therapy) and emphasised data completeness. The error rate evaluated syntactic accuracy and consistency of data. The generalisability score evaluated believability of the demographic and treatment information. Correlations among the three scores and the number of patients per centre were evaluated.

Results

Errors were identified at the median rate of 3 per 100 patient-years. The generalisability score indicated the samples’ representativeness of the known MS epidemiology. Moderate correlation between the density and generalisability scores ($p=0.58$) and a weak correlation between the error rate and the other two scores ($p=0.32-0.33$) were observed. The generalisability score was strongly correlated with centre size ($p=0.79$).

Conclusion

The implemented scores enable objective evaluation of the quality of observational MS data, with an impact on the design of future analyses.

Main text

Introduction

Observational data play an important role in the multiple sclerosis (MS) research. While traditionally utilised in epidemiology and the research of risk factors, observational cohorts have become a valuable source of information for the studies of treatment effectiveness and safety, disease management and outcomes.¹ In particular, pragmatic trials utilising sophisticated analytical methodology, which have been known in diabetology and cardiology for more than two decades^{2, 3} are now gaining momentum in neuroimmunology.⁴⁻⁶

The evidence generated from observational data carries two important limitations: residual bias (for review see ⁷) and variable data quality. In MS research, the latter has yet to be addressed in a systematic way. The National Institutes of Health has emphasised data quality and included it as a review criterion.⁸ A Data Quality Collaborative was established in order to address the problems with observational data quality and has published recommendations comprising descriptions of data capture, processing, data elements and analysis-specific data elements.⁹

MSBase is a large, global observational cohort study, whose mission is to further the knowledge of MS epidemiology, aetiology and management and to generate evidence that will lead to improved outcomes of patients with this disease.¹⁰ We have developed and implemented an automated data quality, density and generalisability process aiming at providing standardised, transparent, reproducible and highly granular information about the published data. The process will facilitate further improvement of data quality in MSBase and its collaborating centres. It will also enable quality-driven selection of research data and will enhance quality and generalisability of the generated evidence. Here we provide a detailed overview of

the MSBase data quality, density and generalisability process and demonstrate its translational potential.

Materials and Methods

Ethics

MSBase (registered with WHO ICTRP, ID ACTRN12605000455662) was approved by the Melbourne Health Human Research Ethics Committee¹⁰ and the local ethics committees in all participating centres (or exemptions were granted, according to local laws and regulations). Enrolled patients provided written informed consent as required.

Participants and definitions

The data quality and generalisability scores were developed using the information from all 35,869 patients diagnosed with MS or clinically isolated syndrome represented in MSBase as of November 2015.

The prospective follow-up period was defined as the time between the first and last recorded disability scores. Disability was quantified by treating neurologists, using Expanded Disability Status Scale (EDSS). In order to minimise the EDSS inter-rater error, online Neurostatus certification was required at each participating centre (www.neurostatus.net). Relapses were defined as the occurrence of new symptoms, or exacerbation of existing symptoms, persisting for at least 24 hours, in the absence of concurrent illness or fever, and occurring at least 30 days after a previous relapse.¹¹ Confirmation by increased EDSS was not required.

Quality, density and generalisability of the recorded patient information was evaluated separately at each MSBase centre, assessing four quality metrics:¹²

- completeness (the proportion of the critical variables with data not missing),
- syntactic accuracy (the proportion of the recorded variables with the values corresponding to their range),
- consistency (the proportion of variables congruent with other recorded variables), and
- believability (the proportion of entries which are regarded true and credible).

Data density score

Data density was assessed primarily with respect to completeness across six domains: cumulative follow-up, patient demography, clinical visits, MS relapses, paraclinical data, and disease modifying therapy (Figure 1). The overall data density score was calculated as the sum of the scores within the six domains. The weights were chosen empirically in order to reflect the emphasis of the previous studies conducted using the MSBase data - i.e. clinical descriptors of disease course and activity, and MS therapy.

Cumulative follow-up

Centres were awarded one point for every 1000 patient-years' worth of prospective clinical follow-up. To valorise the centres with patients followed prospectively from early after clinical disease onset, the proportion of patients with first EDSS visit recorded within the year following the first clinical presentation of MS was valued with up to 3 points. Recency of clinical follow-up was assessed by EDSS visits recorded within the preceding year and was valued with 1 point.

Patient demography

Centres reporting ≥ 0.02 pregnancies per female (corresponding to the 4th centile of the non-zero values) were awarded a data density point, in order to mitigate under-reporting of pregnancies.

Clinical visits

Density points were awarded for each visit recorded on average per patient, 1.3 points for the visits with recorded EDSS and 0.2 points for the visits with no EDSS available, which reflects the importance of the documented clinical information (administrative or phone visits were excluded). Higher coefficient of variance of the annual visit frequency indicates greater variability in the frequency of clinical follow-up. Therefore, its inverse value was used as the score for regular clinical follow-up.

MS relapses

Mean annualised relapse rate per centre was rated with 6 (if 0.2-1.5 relapse/year [10th-75th centile]), 3 (if 0-0.2 or 1.5-2.5 relapses/year [$>10^{\text{th}}$ or 75th-85th centile]) or 0 points (if 0 or >2.5 relapse/year [0th or $>85^{\text{th}}$ centile]), based on the known epidemiology of MS relapses.¹³ The completeness of the relapse-related information was evaluated as follows: the proportion of relapses with the information about the symptoms (max 3 points), severity (max 1.5 points), acute treatment (max 2 points), degree of recovery (max 1.5 points), and in addition up to 1 point for the proportion of relapses with all the above information recorded.

Paraclinical data

The paraclinical domain consisted of the information about brain magnetic resonance imaging (MRI) and cerebrospinal fluid: the mean annual frequency of MRI investigations (using square root transformation to mitigate its markedly skewed

distribution), the proportions of MRI's with categorised information about contrast-enhancing lesions (max 4 points), new hyperintense T2 lesions (max 3 points), hyperintense T2 lesions (max 2 points), the proportion of patients with a recorded lumbar puncture (max 0.5 point), result of the cerebrospinal fluid analysis (max 1.5 points), and presence/absence of IgG oligoclonal bands indicating intrathecal immunoglobulin synthesis (max 2 points).

Disease modifying therapy

The therapy domain consisted of the score for the proportion of patients with ≥ 5 -year prospective follow-up after the diagnosis of clinically definite MS in whom disease modifying therapy has been recorded (max 6 points when $\geq 60\%$ patients treated [$\geq 40^{\text{th}}$ centile]), and the proportion of patients with adverse events recorded (max 3 points when $\geq 2\%$ [$\geq 40^{\text{th}}$ centile]).

Error rate

Data quality procedure assessed the recorded data at each centre for syntactic accuracy (i.e. the proportion of records which fall within the realistic range of the given variable) and consistency (i.e. counting incomplete or erroneous dates, dates of MS-related events inconsistent with the date of MS onset or birth date, contradictory entries etc.). Data quality was evaluated across all six domains (see above) and quantified as the number of identified errors per 100 patient-years. In order to minimise inflation of its value, error rate was only calculated for centres with ≥ 25 patient-years of cumulative follow-up.

Generalisability score

Generalisability score is indicative of data believability, which is defined as the proportion of entries that are regarded true and credible with respect to the known epidemiology of MS.

Information about demography and disease modifying therapy was used to calculate the generalisability score separately at each MSBase centre. Female-to-male ratio was quantified with 6 (1.5-5.7:1), 3 (1-1.5:1 or 5.7-9:1) or 0 points (0-1:1 or >9:1).¹⁴ The proportions of patients with the different MS phenotypes were evaluated as follows: relapsing-remitting MS, 4 (60-80%), 2 (15-20% or 80-90%) or 0 points (0-50% or >90%); secondary progressive MS, 1 points (if 20-35%, otherwise 0 points); and primary progressive MS, 0.5 points (if 7-15%, otherwise 0 points).¹⁵ The proportion of patients with ≥5-year prospective follow-up after the diagnosis of clinically definite MS in whom any disease modifying therapy has been recorded was scored with up to 4 points (when ≥80% patients were treated). The proportion of the prospective follow-up time for which patients were treated with disease modifying therapies was awarded up to 2.7 points (max at 90% of time, for more than 90% of the follow-up time, 2.4 were awarded). For each disease modifying therapy represented at MSBase centre (max 14 therapies), 0.4 points were awarded.

Data analysis

The scores were calculated and the analysis was performed using the R package (version 3.1.0).¹⁶ The inferential statistics consisted of six tests of Spearman's rank correlation coefficients between the data error rate, data density score, generalisability score and the number of patients contributed to the MSBase cohort per centre.

Results

In November 2015, the MSBase cohort consisted of 35,869 patients, representing 179,594 patients-years, and followed at 117 actively participating centres in 34 countries (see Supplementary Table 1). The median prospective follow-up was 3.4 years per patient, with the median interval between the visits with EDSS assessments being 8 months. The characteristics of the cohort are shown in Table 1.

Distributions of the variables that informed this assessment are shown in Table 2.

The list of individual variables used to calculate error rate and the density and generalisability scores for each centre is shown in Supplementary Table 2.

The error rate was calculated with the aim of quantifying syntactic accuracy and consistency of the information recorded by the MSBase centres. The median estimated error rate was 3 errors per 100 patient-years (interquartile range 1.9-8.7). Centres contributing greater sample to the MSBase cohort tended to record lower error rates ($\rho=-0.43$, $p=10^{-5}$; see Figure 2).

Completeness of the data was quantified using the data density score. Of its six domains clinical visits and MS relapses contributed the largest weights to the overall score (31% and 26%, respectively). The data density score ranged from 1 to 103 points, with mean±standard deviation of 36 ± 17 . Similarly, the data density score was positively associated with the size of the MSBase centres ($\rho=0.37$, $p=10^{-5}$).

The purpose of the generalisability score was to quantify believability of the recorded information. We have estimated this as the representativeness of the patient cohort recorded at each of the MSBase centres with respect to the known epidemiology of

MS and the use of disease modifying therapies. The generalisability score consisted of the information concerning patient demography, MS phenotypes and exposure to disease modifying therapy. It ranged from 0 to 21 points, with mean±standard deviation of 14±6 and was strongly correlated with MSBase centre size ($\rho=0.79$, $p<10^{-16}$).

The correlation of the error rate with the data density score ($\rho=-0.32$, $p=0.002$) and the generalisability score ($\rho=-0.33$, $p=0.002$) was only weak (see Figure 3). The data density score and the generalisability score were correlated with a moderate strength ($\rho=0.58$, $p=10^{-11}$).

Supplementary Figure shows error rates and the generalisability scores and a breakdown of the data density scores with its six domains for the individual MSBase centres. The majority of the centres reached error rates between 0 and 20 errors per 100 patient-years, with 7 centres reaching error rates of <1 . While for the majority of the centres the representation of the score components was consistent with the contribution of the components to the overall score, a small number of centres included information from only a small number of patients and their scores were driven by the high granularity of the clinical visits data. These sub-cohorts typically represented treatment-specific cohorts with dense clinical follow-up (such as monthly EDSS in patients treated with natalizumab, which is a requisite of access to these therapies in some jurisdictions).

As an example of the implementation of the procedure aiming at maximising data quality, density and representativeness, we have applied the following criteria to model a patient sample from the MSBase cohort: maximum error rate of 1.6 per 100 patient-years, data density score ≥ 60 (i.e. $\geq 58\%$ of the maximum score), generalisability score ≥ 15 (i.e. $\geq 71\%$ of the maximum score) and number of patients

contributed per centre ≥ 25 . The resulting sample consisted of 6327 patients (71% female) from 3 centres (error rates 0.4, 1.2, 1.6, data density scores 63, 79, 72, and generalisability scores 19, 21, 16, and patients contributed per centre 1308, 3493, 1526, respectively), with 52,889 patient-years of prospective follow-up (mean follow-up 8.4 years per patient), the mean of 19 visits recorded per patient (2.3 visits per year, 95% of these including an EDSS score), and with 40% of the selected patients having a visit recorded within the previous year. The sample consisted of patients with the following MS phenotypes: relapsing-remitting 73%, secondary progressive 10%, primary progressive 4%, progressive-relapsing 1%, and clinically isolated syndrome 12%. The annualised relapse rate reached 0.54 relapses per year, 91% of the relapse events contained information about relapse phenotype, and 6% of relapses had all information available (including phenotype, severity, therapy and recovery). In 45% of women a pregnancy was recorded. Of the selected patients, 70% have been exposed to disease modifying therapies with the mean on-treatment time being 56% of the prospective follow-up; 13 disease modifying therapies were represented. The recorded incidence of adverse events was 0.11 per patient-year. The mean frequency of brain MRI within the sample was 0.9 per year, with the entries containing the information about hyperintense T2 lesions, contrast-enhancing lesions or the number of new T2 lesions in 45%, 41% and 4%, respectively. In 63% of these patients, a lumbar puncture was recorded, with the information about the cytology and biochemistry recorded in 61% and oligoclonal bands in 27% of the patients. The average frequency of data entry errors was 1.1 per 100 patient-years.

Discussion

Using MSBase, a large global MS cohort study, we have developed and implemented a standardised data quality, density and generalisability process. The process quantifies completeness, accuracy, consistency and believability¹² of demographic, clinical and paraclinical information with respect to the specific requirements of an observational MS cohort. The resulting metrics enable monitoring and improvement of the quality of the data recorded at the participating centres, and provide the basis for selection of high-quality representative data for future analyses.

Hidden confounders represent a major limitation of the studies using observational cohorts.¹ These confounders often originate from the variability in the quality and density of the data recorded within multicentric observational datasets. The risk of hidden bias has prompted the development of recommendations for transparent reporting of data quality in distributed data networks.⁹ MSBase in its multiple publications of observational data has previously used data quality procedures (see Online Supplement 2 for a typical MSBase data quality procedure).¹⁷ However, there has been a need for a unified data quality, density and generalisability protocol, standardised across the MSBase centres, which would incorporate the recommendations of the Data Quality Collaborative, with the potential to inform similar procedures in other observational cohorts.

A methodological template for adopting the process quantifying data completeness, accuracy, consistency and believability was provided in the European Society of Thoracic Surgeons Database (in a setting of a cross-sectional registry).¹⁸ We have extended this concept to a global longitudinal observational cohort study. In a multicentric registry, such evaluation then becomes suitable for comparison of data quality among the contributing sites, as demonstrated in the Manchester

Orthopaedic Database.¹⁹ Importantly, per-centre evaluation of data quality enables identification of error (mainly systematic, and to a lesser extent also random) and provides an invaluable opportunity for improving data quality. An example of this was provided by the data quality process implemented by the Perfusion Downunder Collaboration, collecting information about cardiopulmonary bypass from three regional centres in South Australia.²⁰

Data quality and generalisability are closely related. For example, a Global Network's Maternal Newborn Health Registry (trial registration number NCT01073475) has implemented a performance metric in which data quality metrics (such as the proportion of enrolled subjects or the proportions of measured, estimated and missing birth weights) are combined with the generalisability metrics (such as gender ratio or ratio of stillbirths to early neonatal deaths) into a single composite score.²¹

We have chosen to separate the error rate, and data density and generalisability scores in order to allow for a greater flexibility of their implementation. This allows us to take into consideration the purpose of data acquisition in the individual centres with respect to the scope of the MSBase studies (e.g. generalisability may be of a relatively greater importance for studies of MS epidemiology than studies of a therapeutic intervention in a specific subpopulation).²² In fact, error rate was only weakly correlated with the data density and generalisability scores, and these are therefore likely to be complementary (for a more detailed discussion see ¹).

The data density and generalisability scores were moderately correlated, which is partly determined by a modest overlap in the included variables (i.e. the proportion of patients treated with immunomodulatory therapies). The associations between centre size and error rate or the data density score were only weak, which confirms that the scores are not biased against the smaller centres. It is also worth noting that

the data contributed by MSBase centres with relatively larger patient populations were more likely to be of relatively higher generalisability and therefore more representative of the general MS population.

The new standardised MSBase data quality process is comparable to the data quality assessment for drug safety surveillance system proposed by the Observational Medical Outcomes Partnership, with the emphasis on the detection of data anomalies (represented by the error rate) and determining their cause (as captured by the data density score).²³ Characterisation of the data source has been provided elsewhere.¹⁰ Thus the MSBase error rate and the density score address the issue of data plausibility and the generalisability score (together with the requirement of Neurostatus certification (www.neurostatus.net) for the purpose of disability evaluation at each active MSBase centre) partially addresses the issue of organisation.²⁴

However, in its present format the MSBase data quality process does not involve source data verification and unified, global auditing. This is primarily restricted by the prohibitive cost of source data verification at the scale of a large international collaborative initiative. Hence, the actual data fidelity can only be expected in those MSBase centres where high plausibility and good organisation have been observed.²⁴ In addition, the limited scope of the audit trail implemented within the current MSBase data entry software (iMed) limits the ability to quantify the time lag between events and their entries. The above represent the opportunities for further improvement, namely establishing a unified auditing system and redeveloping the current MSBase audit trail. Because no normative base exists for longitudinal evaluation of MS data quality, ongoing audit of the long-term impact of the data quality process is essential. Further areas for improvement are bundled with

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3 implementation of real-time congruence assessment within the MSBase data entry
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8 The standardised data quality process described above will be implemented as an
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10 automated MSBase process. MSBase will periodically provide feedback to the
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12 participating centres including detailed characteristics of their contributed cohorts,
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14 their overall ranking in data quality, density and generalisability, as well as the
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16 ranking in each of the data density score domains. The three scores will also be
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18 used to define cohorts above the minimum data quality, density and generalisability
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20 for inclusion in the future studies and, where applicable, to calculate weights used in
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22 statistical models. The flexibility allowed by the three separate scores and the six
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24 domains of the data density score will enable researchers to tailor these criteria with
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26 respect to the aims of the particular research studies.
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The list of MSBase Study Group co-investigators and contributors is given in the Online Supplement 1.

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Disclosure statement

Authors did not have any conflict of interest relevant to the presented work. Tomas Kalincik has served on an advisory scientific board for Novartis, Merck and Biogen, has received conference travel support and/or speaker honoraria from WebMD Global, Novartis, Biogen, Sanofi, Genzyme, Teva, BioCSL and Merck and has received research support from Biogen. Jens Kuhle's institution (University Hospital Basel) received in the last 3 years and used exclusively for research support: consulting fees from Novartis, Protagen AG; speaker fees from the Swiss MS Society, Biogen, Novartis, Roche, Genzyme; travel expenses from Merck Serono, Novartis; grants from ECTRIMS Research Fellowship Programme, University of Basel, Swiss MS Society, Swiss National Research Foundation, Bayer (Schweiz) AG, Genzyme, Novartis. Eugenio Pucci served on scientific advisory boards for Merck Serono, Genzyme and Biogen; he has received honoraria and travel grants from Sanofi Aventis, UCB, Lundbeck, Novartis, Bayer Schering, Biogen, Merck Serono, Genzyme and Teva; he has received travel grants and equipment from "Associazione Marchigiana Sclerosi Multipla e altre malattie neurologiche". Juan Ignacio Rojas has received honoraria from Novartis as a scientific advisor. He has received travel grants and attended courses and conferences on behalf of Merck-Serono and Novartis. Magda Tsolaki did not declare any competing interests. Carmen-Adella Sirbu received speaking honoraria from Teva, and travel grants from Bayer-Schering and Teva. Mark Slee has participated in, but not received honoraria for, advisory board activity for Biogen, MerckSerono, BayerSchering, Sanofi Aventis and Novartis. Helmut Butzkueven has served on scientific advisory boards for Biogen, Novartis and Sanofi-Aventis and has received conference travel support from Novartis, Biogen and Sanofi Aventis. He serves on steering committees for trials conducted by Biogen and Novartis, and has received research support from Merck Serono, Novartis and Biogen.

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Tables

Table 1

Characteristics of the MSBase cohort

	at inclusion	at last EDSS visit
patients, number (female, %)	35,869 (71%)	
age, years [‡]	38 ± 12	43 ± 12
follow-up duration, years [*]		3.4 (0.3, 8.0)
time from MS onset, years [*]	3.6 (0.8, 10)	9.9 (4.6, 17)
disability, EDSS step [*]	2 (1.5, 3.5)	2.5 (1.5, 5)
annualised relapse rate [*]		0.34 (0, 0.86)
disease course, number (%)		
missing	1882 (5.2%)	0 (0%)
clinically isolated syndrome	7979 (22.2%)	3066 (9.4%)
relapsing-remitting MS	21,600 (60.2%)	23,541 (72.0%)
secondary progressive MS	2183 (6.1%)	3874 (11.8%)
primary progressive MS	1825 (5.1%)	1622 (5.0%)
progressive relapsing MS	388 (1.1%)	603 (1.8%)
visits per patient, number [*]		5 (2, 13)
visit frequency (with EDSS), per year [*]		1.5 (1.4, 2.6)
patients treated with disease modifying therapy during follow-up, number (%)		
any therapy		22,097 (61.6%)
interferon β-1a, IM		6137 (17.1%)
interferon β-1a, SC		7556 (21.1%)
interferon β-1b		5199 (14.5%)
glatiramer acetate		5568 (15.5%)
teriflunomide		601 (1.7%)

dimethyl fumarate	815 (2.3%)
fingolimod	3497 (9.7%)
siponimod	3 (10 ⁻⁵ %)
cladribine	68 (0.2%)
natalizumab	3304 (9.2%)
alemtuzumab	29 (0.1%)
rituximab	78 (0.2%)
mitoxantrone	1126 (3.1%)
autologous hematopoietic stem cell therapy	19 (0.1%)
enrolled in randomised clinical trials	142 (0.4%)
proportion of the follow-up time on disease modifying therapy*	26% (0%, 92%)
total MRI scans per patient, number*	3 (1, 6)
patients with cerebrospinal fluid information, number (%)	14,435 (40%)

‡, mean ± standard deviation

*, median (quartiles)

EDSS, Expanded Disability Status Scale

Table 2
Distributions of the evaluated variables at MSBase centres

patients, number	105 (19, 345)
female, %	69% (65%, 76%)
cumulative follow-up, patient-years	214 (21, 1494)
patients with relapsing-remitting MS, %	82% (73%, 88%)
patients with secondary progressive MS, %	6% (0%, 12%)
patients with primary progressive MS, %	4% (0%, 8%)
patients with a visit within the first year after disease onset, %	22% (11%, 37%)
pregnancies per female	0.07 (0.00, 0.19)
recorded visits per patient, number	4.8 (2.3, 10.6)
coefficient of variance of the recorded visits	0.69 (0.55, 0.90)
annualised relapse rate	0.79 (0.47, 1.33)
relapses with recorded symptomatology, %	92% (74%, 100%)
relapses with recorded severity, %	50% (20%, 91%)
relapses with recorded therapy, %	52% (35%, 74%)
relapses with recorded recovery , %	47% (24%, 83%)
relapses with complete information, %	15% (4%, 42%)
annual frequency of MRI	1.06 (0.49, 1.98)
MRI's with reported contrast-enhancing lesions, %	29% (6%, 60%)
MRI's with reported new hyperintense T2 lesions, %	9% (1%, 26%)
MRI's with reported hyperintense T2 lesions, %	55% (11%, 90%)
patients with recorded lumbar puncture, %	33% (14%, 57%)
patients with reported CSF information, %	18% (5%, 41%)
patients with reported IgG oligoclonal band status, %	5% (0%, 16%)
patients with ≥5-year prospective follow-up and recorded therapy, %	

	76% (0%, 92%)
patients with a reported adverse event, %	4% (0, 16%)
error rate (per 100 patient-years)	3.0 (1.9, 8.7)

The data are shown as median (quartiles).
CSF, cerebrospinal fluid; MRI, magnetic resonance imaging

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Figure legends

Figure 1

Contribution of patient characteristics to the data density score (and its domains), error rate and generalisability score.

Figure 2

Associations between the number of patients contributed to the global cohort per MSBase centre and the corresponding error rate ($p=-0.43$), data density score ($p=0.37$) and generalisability score ($p=0.79$).

Figure 3

Associations among error rate, data density score and generalisability score. Circle size indicates the size of the cohort contributed by centre. Weak associations between error rate and the data density score ($p=-0.32$) and the generalisability score ($p=-0.33$), and moderate association between the data density score and the generalisability score ($p=0.58$) were observed.

Online supplementary material

Online Supplement 1

MSBase Scientific Leadership Group, co-investigators and contributors

Online Supplement 2

A typical data quality assessment applied in a number of previous MSBase studies

Supplementary Table 1

Number of participating patients per centre

Supplementary Table 2

Individual variables used to calculate error rate, the data density score and the generalisability score for each MSBase centre

Supplementary Figure

Error rate, data density score (and its components) and generalisability score calculated for each MSBase centre.

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Contribution of patient characteristics to the data density score (and its domains), error rate and generalisability score.

Figure 1
480x868mm (120 x 120 DPI)

Associations between the number of patients contributed to the global cohort per MSBase centre and the corresponding error rate ($\rho=-0.43$), data density score ($\rho=0.37$) and generalisability score ($\rho=0.79$).

Figure 2

69x166mm (300 x 300 DPI)

Associations among error rate, data density score and generalisability score. Circle size indicates the size of the cohort contributed by centre. Weak associations between error rate and the data density score ($\rho=-0.32$) and the generalisability score ($\rho=-0.33$), and moderate association between the data density score and the generalisability score ($\rho=0.58$) were observed.

Figure 3
69x170mm (300 x 300 DPI)

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For Peer Review

A typical MSBase data quality assessment

- Duplicate patient records were removed.
- Centres with <10 patient record were excluded.
- Patients with missing date of birth were excluded.
- MS onset dates after the MSBase data extract date were removed.
- Patients with missing date of the first clinical presentation of MS were excluded.
- The dates of MS onset and the first recorded MS course were aligned.
- Patients with the age at onset outside the 0-100 range were excluded.
- A logical sequence of the MS courses (e.g. clinically isolated syndrome, relapsing-remitting MS, secondary progressive MS) was assured.
- Records of the initiation of the progressive MS prior to its clinical onset were excluded.
- Visits with missing visit date or the recorded date before the clinical MS onset or after the date of MSBase data extract were removed.
- EDSS scores outside the range of possible EDSS values were removed.
- Duplicate visits were merged.
- MS relapses with missing visit date or the recorded date after the date of MSBase data extract were removed.
- Duplicate MS relapses were merged.
- Relapses occurring within 30 days of each other were merged.
- Visits preceded by relapses were identified and time from the last relapse was calculated for each visit.
- Therapies were labelled as discontinued or continuing.
- Therapies with erroneous date entries were removed (e.g. commencement date > termination date, commencement after the MSBase data extract date, commencement of disease modifying therapy before the year 1980).
- MS disease modifying therapies were identified and labelled.
- Duplicate treatment entries were removed.
- Where multiple disease modifying therapies were recorded simultaneously, treatment end date of the previous therapy was imputed as the commencement date of the following therapy.
- Consecutive entries for certain disease modifying therapies were merged into a continuous treatment entry, given that the gap between the entries did not exceed 190 days for mitoxantrone, 365 days for cladribine, 90 days for other disease modifying therapies.
- The minimum duration of treatment effect was recorded as 190 days (mitoxantrone), 5 years (alemtuzumab) or 365 days (cladribine) from treatment commencement.
- MRI entries with missing or erroneous date (before the first clinical presentation of MS or after the MSBase data extract date) were removed.
- The terminology used for the McDonald criteria, Barkhoff criteria and the T2 or T1 contrast-enhancing lesions was unified across the entries.
- Duplicate MRI entries were merged.
- Cerebrospinal fluid entries with missing or erroneous date (before the first clinical presentation of MS or after the MSBase data extract date) were removed.
- The terminology used to describe the result of the cerebrospinal fluid analysis was unified across the entries.

Number of participating patients per centre

Centre	Patients
General University Hospital and Charles University, Prague, Czech Republic	3492
Isfahan University of Medical Sciences, Isfahan, Iran	1857
University 'G. d'Annunzio', Chieti, Italy	1842
Hospital Universitario Virgen Macarena, Sevilla, Spain	1705
University of Bari, Bari, Italy	1526
Hopital Notre Dame, Montreal, Canada	1308
University Hospital Nijmegen, Nijmegen, Netherlands	1245
Amiri Hospital, Kuwait, Kuwait	1136
Neuro Rive-Sud, Greenfield Park, Canada	1133
19 Mayis University, Medical Faculty, Samsun, Turkey	1021
KTU Medical Faculty Farabi Hospital, Trabzon, Turkey	969
Nuovo Ospedale Civile Sant'Agostino/Estense, Modena, Italy	885
Golestan, Ahvaz, Iran	874
Centre de réadaptation déficience physique Chaudière-Appalache, Levis, Canada	863
University of Melbourne, Melbourne, Australia	820
Box Hill Hospital, Box Hill, Australia	738
Zuyderland Ziekenhuis, Sittard, Netherlands	686
Hospital Universitario La Paz, Madrid, Spain	665
Cliniques Universitaires Saint-Luc, Brussels, Belgium	609
Ospedali Riuniti di Salerno, Salerno, Italy	603
University Newcastle, Newcastle, Australia	566
Bombay Hospital Institute of Medical Sciences, Mumbai, India	565
Azienda Sanitaria Unica Regionale Marche - AV3, Macerata, Italy	528
Kommunehospital, Arhus C, Denmark	451
C. Mondino National Neurological Institute, Pavia, Italy	429
Jeroen Bosch Ziekenhuis, Den Bosch, Netherlands	402
Brain and Mind Centre, Camperdown, Australia	391
Groene Hart Ziekenhuis, Gouda, Netherlands	362
Hospital Germans Trias i Pujol, Badalona, Spain	348
Flinders Medical Centre, Adelaide, Australia	345
Azienda Ospedaliera di Rilievo Nazionale San Giuseppe Moscati, Avellino, Italy	345
Royal Hobart Hospital, Hobart, Australia	329
Liverpool Hospital, Liverpool, Australia	308
Royal Brisbane and Women's Hospital, Spring Hill, Australia	303
Hospital Universitario Virgen de Valme, Seville, Spain	300
Hospital São João, Porto, Portugal	292
University of Parma, Parma, Italy	291
University of Florence, Florence, Italy	282
Hospital Italiano, Buenos Aires, Argentina	246
Westmead Hospital, Sydney, Australia	245
FLENI, Buenos Aires, Argentina	221
Monash Medical Centre, Melbourne, Australia	216
Craigavon Area Hospital, Craigavon, United Kingdom	207
Nemocnice Jihlava, Jihlava, Czech Republic	196
Hospital de Galdakao-Usansolo, Galdakao, Spain	186
Royal Victoria Hospital, Belfast, United Kingdom	179
Hopital Tenon, Paris, France	176
Institute of Neuroscience Buenos Aires, Buenos Aires, Argentina	174
CIREN, Havana, Cuba	161
Multiple Sclerosis Centre Kamillus-Klinik, Asbach, Germany	149
Franciscus Ziekenhuis, Roosendaal, Netherlands	140
CSSS Saint-Jérôme, Saint-Jerome, Canada	138
The Alfred, Melbourne, Australia	130
Hospital Donostia, San Sebastián, Spain	123
Geelong Hospital, Geelong, Australia	116
Sir Charles Gairdner Hospital, Perth, Australia	114
St Vincents Hospital, Melbourne, Australia	114
Mater Dei Hospital, Balzan, Malta	106

1		
2		
3	Hospital Fernandez, Capital Federal, Argentina	105
4	New York University Langone Medical Center, New York, United States	103
5	Assaf Harofeh Medical Center, Beer-Yaakov, Israel	94
6	South East Trust, Belfast, United Kingdom	93
7	Hospital Ecoville, Curitiba, Brazil	90
8	PGIMER, Chandigarh, India	88
9	Jahn Ferenc Teaching Hospital, Budapest, Hungary	78
10	Hospital Angeles de las Lomas, Mexico, Mexico	78
11	Jewish General Hospital, Montreal, Canada	73
12	King Fahad Specialist Hospital-Dammam, Khobar, Saudi Arabia	67
13	Royal North Shore Hospital, Sydney, Australia	66
14	Consultorio Privado, Capital Federal, Argentina	65
15	Austin Health, Heidelberg, Australia	45
16	Clinic of Neurology Clinical Center, Skopje, Macedonia	43
17	Royal Brisbane and Women's Hospital, Brisbane, Australia	41
18	Thomas Jefferson University, United States	40
19	Alexandria University Hospital, Alexandria, Egypt	30
20	Semmelweis University Budapest, Budapest, Hungary	28
21	Instituto de Neurociencias Cordoba, Cordoba, Argentina	27
22	Central Clinical Emergency Military Hospital, Bucharest, Romania	26
23	HIGA Gral. San Martin La Plata, La Plata, Argentina	25
24	Concord Repatriation General Hospital, Concord West, Australia	25
25	University of Debrecen, Debrecen, Hungary	24
26	Péterfy Sandor Hospital, Budapest, Hungary	24
27	Sanatorio Allende, Cordoba, Argentina	22
28	Clinica Modelo de Lanus, Lanus, Argentina	19
29	Universidade Metropolitana de Santos, Santos, Brazil	19
30	Veszprém Megyei Csolnok Ferenc Kórház zrt., Veszprem, Hungary	19
31	Josa András Hospital, Nyiregyhaza, Hungary	19
32	Petz A. County Hospital, Győr, Hungary	19
33	Hospital Kuala Lumpur, Kuala Lumpur, Malaysia	18
34	Macquarie University Hospital, Sydney, Australia	17
35	The Walton Centre for Neurology and Neurosurgery, Liverpool, United Kingdom	13
36	BAZ County Hospital, Miskolc, Hungary	13
37	Penang General Hospital, Penang, Malaysia	13
38	Instituto Rodriguez Alfici, Mendoza, Argentina	12
39	Szent Imre Hospital, Budapest, Hungary	12
40	Clinical Centar-Neurology, Skopje, Macedonia	12
41	CHRT, Trois-Rivieres, Canada	11
42	Hospital de Clinicas, Buenos Aires, Argentina	9
43	Instituto de Seguridad Social de Guatemala, Guatemala, Guatemala	9
44	Azienda Ospedaliera San Luigi di Orbassano, Torino, Italy	9
45	Hospital Fernando Fonseca, Amadora, Portugal	9
46	Hadassah University Hospital, Jerusalem, Israel	8
47	Universitätsspital Basel, Basel, Switzerland	7
48	Università, Napoli, Italy	7
49	University of Pécs, Pecs, Hungary	6
50	Kaposi Mór Teaching Hospital, Kaposvar, Hungary	6
51	University of Szeged, Szeged, Hungary	6
52	G. Papanicolaou Hospital, Thessaloniki, Greece	5
53	UT Southwestern, Dallas, United States	4
54	Hospital San Bernanrdo, San Bernardo, Argentina	3
55	San Carlo Borromeo, Milan, Italy	3
56	Hospital sultanah Nora Ismail, Batu Pahat, Malaysia	3
57	Dr Lutfi Kirdar Kartal Education and Research Hosp., Istanbul, Turkey	3
58	Cheng Hsin General Hospital, Taipei, Taiwan, China	2
59	Hospital Mancha Centro, Alcazar de San Juan, Spain	1
60	Sheba Medical Center, Ramat Gan, Israel	1
	University of Maiduguri Teaching Hospital, Maiduguri, Nigeria	1

centre	patients	% MSBase population	% with follow-up in the previous year	cumulative follow-up (years)	% with first EDSS within the year of MS onset	mean follow-up (years)	follow-up SD	follow-up CoV
001	221	0.59%	3%	444	42%	2.0	2.6	1.3
002	126	0.34%	5%	567	20%	4.5	3.6	0.8
003	9	0.02%	0%	49	56%	5.4	4.5	0.8
004	19	0.05%	0%	38	21%	2.0	2.8	1.4
005	12	0.03%	0%	0	0%	0.0	0.0	0.0
006	182	0.49%	5%	647	18%	3.6	3.8	1.1
007	28	0.08%	0%	33	18%	1.2	0.9	0.7
008	65	0.17%	0%	217	28%	3.3	1.9	0.6
009	246	0.66%	6%	953	38%	3.9	4.0	1.0
010	25	0.07%	0%	88	24%	3.5	2.6	0.7
011	23	0.06%	74%	93	70%	4.0	3.0	0.8
012	3	0.01%	100%	1	0%	0.4	0.4	0.9
013	114	0.31%	11%	177	18%	1.6	2.2	1.4
014	392	1.05%	27%	538	8%	1.4	2.2	1.6
015	843	2.27%	71%	4668	23%	5.5	4.0	0.7
016	66	0.18%	0%	3	5%	0.0	0.2	3.8
017	580	1.56%	61%	2213	18%	3.8	3.0	0.8
018	116	0.31%	1%	291	26%	2.5	2.0	0.8
019	120	0.32%	19%	359	15%	3.1	4.0	1.3
020	240	0.65%	33%	163	5%	0.7	0.5	0.8
021	342	0.92%	84%	1483	9%	4.3	5.1	1.2
022	774	2.08%	67%	3803	18%	4.9	3.7	0.8
023	246	0.66%	63%	734	22%	3.0	2.1	0.7
024	358	0.96%	74%	1686	14%	4.7	4.1	0.9
025	315	0.85%	83%	1363	18%	4.3	4.6	1.1
026	329	0.88%	2%	1184	5%	3.6	2.6	0.7
027	145	0.39%	75%	226	15%	1.6	1.5	1.0
028	45	0.12%	91%	275	29%	6.1	6.0	1.0
029	21	0.06%	95%	18	10%	0.9	0.7	0.8
030	27	0.07%	63%	17	11%	0.6	1.2	1.9
031	56	0.15%	100%	228	29%	4.1	4.1	1.0
032	632	1.70%	53%	4504	29%	7.1	5.6	0.8
033	1	0.00%	0%	5	100%	4.9	0.0	0.0
034	105	0.28%	0%	116	12%	1.3	3.3	2.6
035	59	0.16%	93%	235	68%	4.0	4.0	1.0
036	184	0.49%	97%	736	36%	4.0	2.4	0.6
037	73	0.20%	44%	395	59%	5.4	3.1	0.6
038	1308	3.52%	59%	15745	18%	12.0	7.0	0.6
039	16	0.04%	0%	34	6%	3.1	2.4	0.8
040	864	2.32%	67%	8087	23%	9.4	4.9	0.5
041	1149	3.09%	33%	6640	25%	5.8	4.4	0.8
042	7	0.02%	0%	11	57%	1.6	1.6	1.0

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2	043	161	0.43%	0%	1188	94%	7.4	3.8	0.5
3	044	3526	9.48%	73%	24042	30%	6.8	4.9	0.7
4	045	196	0.53%	99%	542	51%	2.8	1.4	0.5
5	046	151	0.41%	0%	3	1%	0.0	0.1	5.0
6	047	451	1.21%	1%	2379	37%	5.3	5.5	1.0
7	048	30	0.08%	13%	0	0%	0.0	0.0	0.0
8	049	300	0.81%	69%	1841	45%	6.1	4.1	0.7
9	050	135	0.36%	87%	924	39%	6.8	4.6	0.7
10	051	665	1.79%	0%	2835	25%	4.3	4.6	1.1
11	052	95	0.26%	62%	441	39%	4.6	4.1	0.9
12	053	1705	4.58%	68%	13096	33%	7.7	5.9	0.8
13	054	1	0.00%	0%	1	0%	1.4	0.0	0.0
14	055	190	0.51%	89%	704	37%	3.7	2.6	0.7
15	056	348	0.94%	49%	1894	17%	5.4	4.5	0.8
16	057	27	0.07%	96%	119	74%	4.4	4.2	0.9
17	058	176	0.47%	0%	131	88%	0.7	1.3	1.7
18	059	13	0.03%	0%	13	100%	1.0	1.3	1.4
19	060	207	0.56%	0%	528	16%	2.5	3.6	1.4
20	061	179	0.48%	28%	257	5%	1.4	3.0	2.1
21	062	96	0.26%	82%	190	25%	2.0	2.0	1.0
22	063	8	0.02%	25%	0	13%	0.0	0.0	0.0
23	064	15	0.04%	0%	0	7%	0.0	0.0	0.0
24	065	19	0.05%	0%	62	0%	3.3	2.2	0.7
25	066	78	0.21%	0%	332	18%	4.3	3.6	0.9
26	067	28	0.08%	57%	50	18%	1.8	1.1	0.6
27	068	24	0.06%	88%	174	38%	7.3	4.0	0.6
28	069	24	0.06%	0%	52	4%	2.2	1.5	0.7
29	070	19	0.05%	0%	26	0%	1.4	0.9	0.6
30	071	19	0.05%	0%	29	21%	1.5	1.4	0.9
31	072	13	0.03%	0%	28	0%	2.2	1.1	0.5
32	073	12	0.03%	0%	67	17%	5.6	3.9	0.7
33	074	6	0.02%	0%	21	17%	3.5	2.7	0.8
34	075	6	0.02%	17%	14	17%	2.3	1.9	0.8
35	076	6	0.02%	83%	39	83%	6.4	4.7	0.7
36	077	1	0.00%	0%	0	0%	0.0	0.0	0.0
37	078	8	0.02%	0%	39	0%	4.9	4.5	0.9
38	079	94	0.25%	0%	645	18%	6.9	4.3	0.6
39	080	599	1.61%	11%	564	27%	1.0	2.5	2.6
40	081	88	0.24%	0%	9	16%	0.1	0.4	4.2
41	082	1857	4.99%	20%	1824	10%	1.0	1.3	1.4
42	083	875	2.35%	6%	111	26%	0.1	0.9	7.0
43	084	9	0.02%	0%	3	67%	0.3	0.3	0.8
44	085	1872	5.03%	38%	12097	29%	6.5	6.7	1.0
45	086	528	1.42%	52%	3602	28%	6.8	5.5	0.8
46	087	1526	4.10%	24%	14109	40%	9.2	5.6	0.6
47	088	282	0.76%	0%	1281	22%	4.5	4.2	0.9
48	089	7	0.02%	0%	6	29%	0.9	0.8	1.0
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090	429	1.15%	0%	4416	53%	10.3	8.0	0.8
091	621	1.67%	36%	2815	36%	4.5	6.0	1.3
092	291	0.78%	60%	1945	51%	6.7	6.0	0.9
093	360	0.97%	64%	1801	38%	5.0	5.0	1.0
094	3	0.01%	67%	1	33%	0.4	0.4	0.9
095	887	2.38%	41%	6692	47%	7.6	7.1	0.9
096	1200	3.23%	55%	1885	30%	1.6	1.7	1.1
097	12	0.03%	0%	7	75%	0.6	0.7	1.2
098	43	0.12%	16%	214	100%	5.0	3.3	0.7
099	106	0.28%	1%	293	37%	2.8	3.2	1.2
100	78	0.21%	0%	4	14%	0.1	0.4	7.9
101	22	0.06%	45%	17	50%	0.8	1.6	2.1
102	17	0.05%	76%	18	18%	1.0	1.0	1.0
103	3	0.01%	67%	0	100%	0.1	0.1	0.9
104	1	0.00%	0%	4	0%	4.0	0.0	0.0
105	1245	3.35%	0%	3368	11%	2.7	3.8	1.4
106	140	0.38%	0%	249	21%	1.8	1.2	0.7
107	748	2.01%	24%	6064	27%	8.1	7.0	0.9
108	402	1.08%	0%	248	1%	0.6	1.2	1.9
109	375	1.01%	29%	1532	29%	4.1	4.5	1.1
110	337	0.91%	47%	256	3%	0.8	2.4	3.2
111	292	0.79%	0%	2216	22%	7.6	5.5	0.7
112	9	0.02%	0%	6	22%	0.6	0.4	0.6
113	26	0.07%	8%	158	38%	6.1	6.6	1.1
114	73	0.20%	81%	69	8%	0.9	1.0	1.1
115	3	0.01%	0%	0	0%	0.1	0.1	1.7
116	1021	2.74%	49%	3556	39%	3.5	4.4	1.3
117	1081	2.91%	49%	3347	27%	3.1	3.6	1.2
118	46	0.12%	70%	201	46%	4.4	4.8	1.1
119	2	0.01%	0%	0	0%	0.0	0.0	0.0
120	108	0.29%	10%	175	33%	1.6	1.9	1.2
121	4	0.01%	0%	0	25%	0.0	0.0	0.0
122	40	0.11%	0%	0	0%	0.0	0.0	0.0

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mean visit count	visit count SD	visit count CoV	% visits with EDSS	visits with no EDSS	mean visit frequency (per year)	visit frequency SD	visit frequency CoV	relapses	
5.0	5.4	1.1	87%	0.7	7.2	54.7	7.6	515	
6.8	5.5	0.8	69%	2.9	1.9	4.0	2.2	111	
2.8	1.3	0.5	100%	0.0	1.1	1.7	1.6	23	
2.0	1.1	0.6	57%	1.5	40.9	167.1	4.1	9	
0.8	0.5	0.6	64%	0.4	0.0	0.0	0.0	12	
6.6	7.5	1.1	90%	0.6	6.2	23.1	3.7	544	
2.6	1.3	0.5	73%	0.9	2.2	2.0	0.9	42	
4.0	1.5	0.4	96%	0.2	1.7	2.0	1.2	55	
9.5	12.1	1.3	99%	0.1	4.1	23.4	5.7	566	
3.1	1.3	0.4	96%	0.1	1.3	0.9	0.7	68	
9.2	6.2	0.7	99%	0.1	2.9	1.5	0.5	56	
2.3	1.2	0.5	100%	0.0	3.2	2.8	0.9	4	
3.4	3.5	1.1	69%	1.5	2.0	3.2	1.6	8	
2.3	3.2	1.4	19%	9.9	3.0	36.9	12.2	1635	
8.5	5.8	0.7	68%	3.8	1.8	1.5	0.8	2658	
0.5	0.6	1.2	20%	2.1	0.3	1.2	3.9	123	
7.9	6.3	0.8	91%	0.6	2.4	2.6	1.1	2353	
3.9	2.8	0.7	96%	0.2	1.8	1.4	0.8	263	
2.9	3.2	1.1	17%	13.9	0.8	1.2	1.5	348	
2.4	1.3	0.5	92%	0.2	3.1	4.2	1.3	88	
3.9	4.5	1.2	25%	11.7	1.2	3.5	3.1	904	
7.4	6.0	0.8	61%	4.6	1.6	1.5	0.9	2972	
5.8	3.4	0.6	72%	2.0	2.3	2.0	0.9	631	
5.9	4.4	0.7	58%	4.2	1.6	2.1	1.3	979	
5.3	4.0	0.8	67%	2.6	2.3	4.7	2.0	1078	
2.4	0.9	0.4	91%	0.2	1.2	1.6	1.3	7	
2.4	1.7	0.7	32%	5.1	1.3	1.3	1.0	61	
7.9	7.1	0.9	33%	15.7	3.3	7.9	2.4	202	
2.6	1.5	0.6	40%	3.8	2.7	1.9	0.7	18	
1.9	1.5	0.8	96%	0.1	1.5	2.3	1.6	29	
2.9	2.0	0.7	35%	5.3	0.7	1.0	1.4	160	
8.4	6.3	0.8	67%	4.2	1.7	4.1	2.5	2487	
10.0	0.0	0.0	100%	0.0	2.1	0.0	0.0	3	
1.9	1.9	1.0	26%	5.0	3.8	9.3	2.4	0	
6.3	4.2	0.7	98%	0.1	2.7	3.6	1.3	131	
7.4	4.2	0.6	81%	1.3	2.0	0.9	0.4	154	
12.8	7.6	0.6	99%	0.1	2.6	0.9	0.4	174	
13.6	7.5	0.5	74%	4.8	1.3	0.9	0.7	6806	
5.8	3.3	0.6	53%	5.1	2.9	2.5	0.9	49	
12.5	6.8	0.5	75%	4.2	1.5	0.8	0.5	4522	
7.7	5.6	0.7	98%	0.1	1.5	1.9	1.2	2395	
4.6	4.2	0.9	97%	0.1	2.6	2.7	1.0	17	

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2	12.4	7.0	0.6	99%	0.2	2.1	2.2	1.0	542
3	22.0	18.8	0.9	99%	0.2	3.3	2.2	0.7	13750
4	9.2	2.9	0.3	100%	0.0	4.0	1.6	0.4	594
5	1.0	0.3	0.3	99%	0.0	0.9	5.3	6.1	21
6	3.6	2.7	0.7	99%	0.0	3.0	6.2	2.1	2490
7	0.0	0.2	5.5	4%	0.8	0.0	0.0	0.0	58
8	13.9	8.6	0.6	87%	2.1	2.8	1.8	0.6	980
9	13.1	7.9	0.6	72%	4.7	2.1	1.2	0.6	661
10	5.5	5.2	1.0	48%	5.9	2.0	7.4	3.8	2426
11	4.0	2.8	0.7	96%	0.2	1.2	1.8	1.6	210
12	13.0	9.1	0.7	99%	0.1	2.3	3.3	1.4	7619
13	4.0	0.0	0.0	100%	0.0	2.8	0.0	0.0	1
14	13.1	10.1	0.8	94%	0.7	5.0	4.9	1.0	527
15	6.7	5.0	0.7	96%	0.3	1.2	1.2	1.0	1363
16	8.7	6.8	0.8	100%	0.0	3.0	2.9	1.0	97
17	2.4	2.2	0.9	90%	0.3	2.6	5.2	2.0	319
18	2.2	1.3	0.6	78%	0.6	2.0	2.3	1.2	12
19	3.1	2.0	0.6	41%	4.5	1.6	1.2	0.7	485
20	1.7	1.9	1.1	39%	2.6	0.4	0.8	1.8	774
21	3.5	2.8	0.8	61%	2.3	1.8	1.9	1.1	345
22	0.3	0.5	1.9	29%	0.6	0.0	0.0	0.0	24
23	0.1	0.3	3.0	100%	0.0	0.0	0.0	0.0	17
24	28.6	17.8	0.6	95%	1.5	9.0	3.3	0.4	136
25	21.2	11.9	0.6	92%	1.7	7.8	4.7	0.6	564
26	21.0	12.7	0.6	98%	0.3	12.2	2.3	0.2	111
27	47.9	19.2	0.4	97%	1.3	7.7	3.7	0.5	161
28	25.3	19.0	0.8	96%	1.2	12.7	5.3	0.4	132
29	12.9	6.5	0.5	76%	4.1	10.3	4.4	0.4	103
30	9.7	10.3	1.1	72%	3.8	7.8	5.4	0.7	84
31	21.2	12.8	0.6	79%	5.7	9.9	2.8	0.3	83
32	18.3	6.5	0.4	71%	7.4	4.6	2.8	0.6	86
33	18.3	7.0	0.4	71%	7.3	7.8	4.2	0.5	38
34	17.3	14.1	0.8	50%	17.5	5.3	4.8	0.9	62
35	21.3	6.4	0.3	100%	0.0	5.6	4.7	0.8	35
36	1.0	0.0	0.0	100%	0.0	0.0	0.0	0.0	0
37	4.8	2.8	0.6	93%	0.4	1.2	0.9	0.7	39
38	23.7	15.4	0.7	98%	0.5	3.6	1.2	0.3	444
39	1.3	1.8	1.4	49%	1.3	0.8	3.3	4.3	1334
40	1.2	1.4	1.1	83%	0.3	1.0	4.2	4.0	119
41	2.7	3.3	1.2	98%	0.0	2.3	9.4	4.1	445
42	1.0	0.3	0.3	99%	0.0	0.7	14.8	20.9	0
43	2.8	1.5	0.5	96%	0.1	17.8	28.6	1.6	16
44	10.8	11.2	1.0	90%	1.2	2.2	4.6	2.1	6184
45	15.9	14.2	0.9	72%	4.6	2.7	4.2	1.6	2435
46	18.1	11.3	0.6	97%	0.5	2.1	1.1	0.5	8715
47	5.8	4.8	0.8	87%	0.9	2.1	6.5	3.1	936
48	3.4	2.4	0.7	83%	0.7	3.2	2.6	0.8	8
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2	16.4	14.1	0.9	98%	0.4	1.8	1.5	0.8	2167
3	8.5	10.6	1.3	97%	0.2	3.7	13.5	3.6	1836
4	18.6	14.8	0.8	97%	0.5	3.5	2.8	0.8	1137
5	9.2	7.8	0.8	97%	0.1	2.3	2.2	1.0	637
6	2.3	1.5	0.7	100%	0.0	3.3	3.8	1.1	4
7	9.7	6.7	0.7	90%	1.1	2.0	2.8	1.4	2508
8	4.9	4.5	0.9	100%	0.0	2.6	3.7	1.4	1222
9	3.4	2.8	0.8	100%	0.0	6.7	13.5	2.0	9
10	10.6	6.6	0.6	94%	0.6	6.2	21.9	3.6	76
11	3.3	3.9	1.2	52%	2.8	1.3	1.6	1.3	226
12	1.0	0.3	0.2	96%	0.0	0.1	0.5	7.5	20
13	1.7	1.7	1.0	68%	0.8	2.4	3.9	1.6	36
14	2.1	0.8	0.4	100%	0.0	2.6	4.0	1.5	42
15	1.7	0.6	0.3	100%	0.0	8.1	7.1	0.9	1
16	17.0	0.0	0.0	100%	0.0	4.3	0.0	0.0	9
17	2.8	3.0	1.1	95%	0.1	0.8	2.0	2.5	3230
18	4.4	2.5	0.6	75%	1.5	2.3	1.5	0.6	328
19	10.5	7.0	0.7	72%	3.6	1.8	2.2	1.2	2834
20	1.2	1.3	1.1	98%	0.0	0.8	1.7	2.1	231
21	4.4	4.4	1.0	54%	2.8	1.1	1.7	1.5	1070
22	0.6	0.9	1.4	6%	7.3	0.2	1.3	7.5	787
23	13.6	8.7	0.6	78%	3.9	2.0	1.3	0.7	512
24	2.2	0.7	0.3	43%	3.0	3.6	2.7	0.8	27
25	5.0	2.5	0.5	97%	0.1	1.2	0.7	0.6	53
26	3.0	2.4	0.8	88%	0.4	2.9	2.4	0.8	63
27	1.3	0.6	0.4	57%	1.0	3.9	6.8	1.7	3
28	6.3	6.7	1.1	90%	0.6	3.9	12.1	3.1	3116
29	5.1	4.9	1.0	89%	0.6	3.3	9.7	3.0	3805
30	7.7	7.8	1.0	95%	0.4	2.9	3.3	1.1	129
31	0.0	0.0	0.0	0%	0.5	0.0	0.0	0.0	3
32	2.3	1.7	0.7	96%	0.1	0.8	0.8	1.1	133
33	1.0	0.0	0.0	100%	0.0	0.0	0.0	0.0	4
34	0.0	0.0	0.0	0%	0.0	0.0	0.0	0.0	0
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mean annualised relapse rate	annualised relapse rate SD	annualised relapse rate CoV	% relapses with clinical information	% relapses with information on duration	% relapses with information on recovery	% relapses with information on severity
1.2	34.8	30.0	97%	50%	59%	74%
0.2	0.8	4.1	99%	77%	89%	52%
0.5	4.5	9.5	100%	96%	100%	100%
0.2	83.6	351.6	100%	33%	56%	100%
0.0	0.0	0.0	100%	83%	100%	100%
0.8	30.8	36.6	94%	36%	83%	29%
1.3	3.0	2.4	100%	86%	100%	100%
0.3	0.7	2.7	100%	44%	76%	100%
0.6	12.1	20.3	97%	52%	76%	15%
0.8	1.1	1.4	100%	74%	97%	100%
0.6	0.6	0.9	91%	89%	98%	95%
3.2	0.9	0.3	50%	100%	100%	75%
0.0	0.1	1.4	50%	63%	38%	38%
3.0	19.4	6.4	96%	88%	92%	92%
0.6	1.7	2.9	85%	76%	67%	69%
42.1	2.0	0.0	58%	22%	40%	49%
1.1	3.2	3.0	94%	68%	81%	78%
0.9	1.5	1.6	100%	86%	97%	99%
1.0	2.3	2.3	71%	12%	43%	49%
0.5	2.1	3.9	30%	86%	25%	33%
0.6	5.1	8.4	1%	2%	5%	5%
0.8	1.8	2.3	90%	81%	47%	54%
0.9	2.3	2.7	77%	37%	37%	36%
0.6	1.1	2.0	64%	37%	19%	28%
0.8	6.3	7.9	91%	84%	27%	21%
0.0	0.1	15.3	57%	43%	43%	57%
0.3	1.0	3.8	79%	15%	67%	90%
0.7	6.0	8.2	96%	0%	53%	20%
1.0	1.4	1.4	100%	94%	94%	50%
1.7	1.1	0.6	100%	41%	45%	72%
0.7	0.7	1.0	88%	84%	30%	20%
0.6	4.7	8.6	47%	46%	31%	21%
0.6	0.0	0.0	100%	67%	100%	67%
0.0	0.0	0.0	0%	0%	0%	0%
0.6	1.5	2.6	94%	98%	97%	92%
0.2	0.6	3.1	79%	27%	64%	68%
0.4	0.6	1.4	96%	26%	88%	96%
0.4	0.7	1.7	84%	44%	29%	24%
1.4	4.8	3.3	100%	22%	33%	100%
0.6	1.0	1.8	85%	86%	35%	14%
0.4	1.5	4.1	77%	7%	59%	53%
1.5	1.0	0.6	94%	0%	0%	0%

1							
2	0.5	1.8	3.9	99%	98%	98%	99%
3	0.6	1.3	2.3	96%	5%	10%	72%
4	1.1	0.9	0.9	100%	0%	2%	100%
5	6.1	0.8	0.1	100%	86%	100%	100%
6	1.0	7.8	7.5	92%	97%	54%	54%
7	0.0	0.0	0.0	86%	53%	84%	84%
8	0.5	1.3	2.5	79%	71%	48%	70%
9	0.7	0.6	0.9	62%	8%	11%	8%
10	0.9	17.9	20.9	46%	7%	10%	11%
11	0.5	1.7	3.7	88%	11%	17%	10%
12	0.6	4.5	7.8	69%	12%	11%	4%
13	0.7	0.0	0.0	0%	0%	0%	0%
14	0.7	4.6	6.1	96%	96%	94%	95%
15	0.7	2.2	3.1	77%	12%	79%	73%
16	0.8	3.4	4.1	99%	100%	100%	100%
17	2.4	5.6	2.3	100%	20%	5%	7%
18	0.9	2.3	2.5	100%	50%	58%	75%
19	0.9	1.8	2.0	96%	25%	41%	27%
20	3.0	1.7	0.6	66%	18%	5%	0%
21	1.8	2.5	1.4	78%	52%	68%	58%
22	0.0	0.0	0.0	58%	33%	4%	4%
23	0.0	0.0	0.0	100%	94%	24%	24%
24	2.2	2.3	1.0	50%	0%	7%	24%
25	1.7	5.8	3.4	76%	10%	40%	40%
26	2.2	3.4	1.5	95%	73%	86%	92%
27	0.9	0.9	1.0	98%	88%	93%	91%
28	2.5	14.1	5.6	86%	1%	17%	8%
29	3.9	5.2	1.3	82%	0%	40%	41%
30	2.9	9.9	3.5	60%	0%	1%	12%
31	2.9	2.4	0.8	12%	37%	1%	5%
32	1.3	5.1	3.9	55%	3%	0%	1%
33	1.8	1.8	1.0	87%	0%	0%	0%
34	4.5	2.5	0.5	68%	3%	5%	5%
35	0.9	1.2	1.3	100%	63%	97%	97%
36	0.0	0.0	0.0	0%	0%	0%	0%
37	1.0	2.3	2.3	100%	51%	0%	100%
38	0.7	0.7	1.0	100%	79%	48%	100%
39	2.4	3.9	1.7	57%	18%	36%	33%
40	12.9	3.7	0.3	37%	50%	43%	38%
41	0.2	3.8	15.5	95%	2%	12%	12%
42	0.0	0.0	0.0	0%	0%	0%	0%
43	5.1	44.4	8.6	100%	100%	100%	100%
44	0.5	3.2	6.2	78%	4%	54%	40%
45	0.7	3.2	4.8	78%	14%	28%	24%
46	0.6	0.9	1.5	91%	14%	17%	17%
47	0.7	4.9	6.7	100%	9%	57%	7%
48	1.3	1.1	0.8	100%	25%	75%	13%
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1							
2	0.5	1.0	2.1	81%	10%	13%	9%
3	0.7	9.6	14.7	82%	29%	31%	17%
4	0.6	2.5	4.3	93%	40%	40%	52%
5	0.4	1.5	4.1	98%	94%	96%	95%
6	3.0	2.2	0.7	100%	100%	100%	100%
7	0.4	1.8	4.7	92%	15%	45%	20%
8	0.6	2.3	3.6	94%	85%	82%	82%
9	1.3	0.7	0.5	100%	100%	100%	100%
10	0.4	11.1	31.1	74%	37%	84%	75%
11	0.8	1.6	2.0	81%	15%	43%	23%
12	4.7	0.2	0.0	100%	40%	85%	65%
13	2.1	2.7	1.3	86%	42%	42%	47%
14	2.4	2.1	0.9	100%	12%	40%	36%
15	3.0	0.0	0.0	100%	100%	100%	100%
16	2.3	0.0	0.0	100%	11%	33%	100%
17	1.0	2.8	2.9	100%	0%	1%	9%
18	1.3	1.6	1.2	100%	32%	43%	26%
19	0.5	1.9	4.0	96%	1%	36%	10%
20	0.9	0.7	0.7	0%	2%	1%	0%
21	0.7	2.4	3.4	73%	66%	75%	40%
22	3.1	2.4	0.8	36%	17%	26%	23%
23	0.2	0.5	2.2	100%	71%	73%	62%
24	4.7	7.6	1.6	100%	41%	7%	100%
25	0.3	0.4	1.1	94%	89%	94%	92%
26	0.9	2.0	2.2	87%	49%	68%	60%
27	17.7	6.8	0.4	100%	33%	33%	100%
28	0.9	15.4	17.6	93%	60%	79%	72%
29	1.1	8.8	7.7	97%	27%	65%	73%
30	0.6	3.4	5.3	94%	67%	76%	70%
31	0.0	0.0	0.0	67%	100%	100%	33%
32	0.8	0.6	0.7	68%	38%	53%	20%
33	0.0	0.0	0.0	100%	100%	100%	100%
34	0.0	0.0	0.0	0%	0%	0%	0%
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% relapses with treatment information	% relapses with complete information	female (nr)	% female	MRI (count)	MRI frequency (per year)	MRI frequency SD	MRI frequency CoV
35%	15%	138	62%	1003	2.3	54.8	24.2
66%	35%	72	57%	463	0.8	9.2	11.3
100%	100%	7	78%	36	0.7	8.1	11.0
100%	56%	11	58%	25	0.7	167.3	253.1
100%	100%	5	42%	12	0.0	0.0	0.0
53%	14%	130	71%	859	1.3	20.3	15.3
45%	100%	19	68%	65	2.0	1.3	0.6
80%	76%	39	60%	102	0.5	1.9	4.0
38%	6%	168	68%	788	0.8	46.6	56.4
51%	97%	14	56%	46	0.5	1.0	1.8
75%	59%	9	39%	91	1.0	0.8	0.8
100%	50%	2	67%	4	3.2	2.0	0.6
75%	38%	87	76%	476	2.7	3.9	1.5
35%	31%	288	73%	1781	3.3	55.5	16.8
58%	26%	597	71%	3351	0.7	1.9	2.7
53%	22%	48	73%	156	53.5	1.3	0.0
51%	35%	460	79%	4278	1.9	4.0	2.1
47%	44%	95	82%	322	1.1	1.6	1.4
29%	10%	80	67%	829	2.3	5.0	2.2
40%	3%	176	73%	1323	8.1	6.7	0.8
87%	0%	274	80%	2229	1.5	10.5	7.0
45%	17%	558	72%	2894	0.8	2.0	2.6
26%	15%	184	75%	1252	1.7	2.3	1.4
17%	2%	271	76%	3150	1.9	4.4	2.4
28%	4%	260	83%	1452	1.1	5.2	4.9
43%	0%	250	76%	213	0.2	0.9	5.3
77%	43%	107	74%	474	2.1	2.3	1.1
64%	12%	32	71%	313	1.1	16.3	14.3
72%	33%	15	71%	100	5.4	5.9	1.1
55%	21%	18	67%	67	4.0	2.4	0.6
39%	9%	41	73%	221	1.0	1.0	1.1
47%	12%	443	70%	1595	0.4	2.3	6.6
33%	33%	1	100%	7	1.4	0.0	0.0
0%	0%	70	67%	345	3.0	12.1	4.1
64%	55%	44	75%	136	0.6	1.5	2.6
40%	17%	144	78%	545	0.7	1.0	1.4
46%	36%	45	62%	360	0.9	3.3	3.6
7%	1%	993	76%	3620	0.2	1.0	4.4
14%	33%	7	44%	23	0.7	1.8	2.7
35%	3%	649	75%	3668	0.5	1.7	3.8
16%	12%	870	76%	3129	0.5	2.0	4.2
53%	0%	6	86%	13	1.2	1.2	1.0

1								
2	67%	66%	119	74%	746	0.6	0.9	1.5
3	70%	8%	2514	71%	24181	1.0	1.1	1.1
4	47%	2%	135	69%	760	1.4	1.2	0.9
5								
6	100%	100%	106	70%	0	0.0	0.0	0.0
7	25%	12%	300	67%	192	0.1	1.8	22.6
8	83%	62%	23	77%	0	0.0	0.0	0.0
9								
10	52%	19%	208	69%	1115	0.6	1.5	2.5
11	48%	2%	84	62%	937	1.0	1.1	1.1
12	26%	3%	451	68%	1441	0.5	17.9	35.2
13	27%	5%	74	78%	530	1.2	1.5	1.3
14	32%	1%	1137	67%	3830	0.3	1.6	5.5
15	0%	0%	1	100%	0	0.0	0.0	0.0
16								
17	47%	41%	124	65%	1847	2.6	8.9	3.4
18	57%	28%	242	70%	1543	0.8	1.6	1.9
19	69%	69%	21	78%	128	1.1	2.6	2.5
20								
21	33%	3%	125	71%	352	2.7	3.8	1.4
22	67%	50%	8	62%	19	1.5	1.9	1.3
23	23%	8%	138	67%	289	0.5	1.1	2.0
24	9%	0%	130	73%	396	1.5	1.3	0.9
25								
26	25%	17%	70	73%	244	1.3	2.1	1.7
27	13%	0%	5	63%	58	0.0	0.0	0.0
28	12%	0%	8	53%	12	0.0	0.0	0.0
29	65%	4%	15	79%	75	1.2	1.4	1.1
30								
31	68%	24%	60	77%	199	0.6	2.0	3.3
32	75%	60%	16	57%	81	1.6	2.0	1.3
33	84%	78%	15	63%	279	1.6	1.1	0.7
34	83%	3%	18	75%	125	2.4	10.4	4.4
35								
36	78%	37%	11	58%	74	2.8	2.2	0.8
37	80%	1%	16	84%	69	2.4	8.5	3.6
38	67%	0%	10	77%	91	3.2	2.9	0.9
39	65%	0%	11	92%	56	0.8	2.5	3.0
40	84%	0%	4	67%	40	1.9	2.9	1.5
41								
42	71%	5%	5	83%	35	2.5	1.7	0.7
43	94%	89%	6	100%	26	0.7	1.1	1.6
44	0%	0%	0	0%	0	0.0	0.0	0.0
45								
46	13%	0%	3	38%	0	0.0	0.0	0.0
47	50%	48%	63	67%	203	0.3	1.1	3.5
48	32%	13%	394	66%	2233	4.0	6.2	1.6
49	31%	15%	55	63%	56	6.1	0.6	0.1
50	13%	10%	1481	80%	2	0.0	0.0	5.5
51	0%	0%	658	75%	0	0.0	0.0	0.0
52								
53	50%	100%	6	67%	27	8.7	89.2	10.3
54	74%	28%	1266	68%	13099	1.1	4.0	3.7
55	48%	3%	379	72%	3924	1.1	3.4	3.1
56								
57	29%	7%	1027	67%	22302	1.6	2.7	1.7
58	54%	4%	194	69%	1074	0.8	11.9	14.2
59	25%	13%	4	57%	15	2.5	2.8	1.1
60								

1								
2	13%	5%	289	67%	1102	0.2	0.9	3.5
3	41%	6%	418	67%	3514	1.2	19.5	15.6
4	62%	12%	193	66%	3127	1.6	5.5	3.4
5	72%	67%	237	66%	3101	1.7	3.0	1.7
6	50%	50%	2	67%	6	4.5	1.9	0.4
7	59%	10%	611	69%	6243	0.9	4.5	4.8
8	75%	58%	790	66%	3120	1.7	2.8	1.7
9	89%	100%	5	42%	7	1.0	7.0	7.1
10	50%	30%	27	63%	77	0.4	0.5	1.5
11	64%	11%	63	59%	427	1.5	3.5	2.4
12	50%	65%	56	72%	13	3.1	0.1	0.0
13	22%	8%	17	77%	47	2.8	3.5	1.3
14	19%	14%	15	88%	2	0.1	0.0	0.0
15	100%	100%	2	67%	5	15.2	7.1	0.5
16	100%	33%	1	100%	2	0.5	0.0	0.0
17	55%	1%	853	69%	924	0.3	1.5	5.6
18	91%	23%	109	78%	126	0.5	0.6	1.3
19	50%	1%	538	72%	2815	0.5	1.6	3.5
20	1%	0%	274	68%	0	0.0	0.0	0.0
21	82%	29%	272	73%	1273	0.8	2.3	2.8
22	83%	10%	242	72%	314	1.2	0.2	0.2
23	81%	43%	206	71%	1430	0.6	0.8	1.2
24	70%	7%	9	100%	22	3.8	4.6	1.2
25	70%	64%	15	58%	78	0.5	0.6	1.2
26	56%	25%	43	59%	112	1.6	2.0	1.3
27	67%	33%	1	33%	4	23.6	3.4	0.1
28	57%	38%	669	66%	4252	1.2	11.5	9.6
29	49%	34%	741	69%	4483	1.3	10.9	8.1
30	74%	48%	29	63%	245	1.2	5.0	4.1
31	100%	33%	2	100%	2	0.0	0.0	0.0
32	43%	11%	83	77%	315	1.8	1.3	0.7
33	75%	100%	4	100%	5	0.0	0.0	0.0
34	0%	0%	29	73%	28	0.0	0.0	0.0
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% MRI with information on T2 lesions	% MRI with information on enhancing lesions	% MRI with information on T2 lesion count	% MRI with complete information	CSF count	% with CSF information	% with CSF results
95%	93%	1%	1%	107	48%	85%
98%	96%	6%	6%	73	58%	96%
94%	100%	100%	94%	9	100%	100%
96%	96%	24%	24%	0	0%	0%
25%	100%	100%	25%	12	100%	42%
98%	90%	2%	2%	72	40%	92%
94%	34%	26%	20%	4	14%	100%
88%	76%	42%	35%	11	17%	82%
99%	95%	11%	11%	120	49%	93%
96%	70%	0%	0%	5	20%	100%
91%	91%	8%	8%	13	57%	92%
100%	100%	25%	25%	0	0%	0%
0%	0%	0%	0%	1	1%	100%
60%	35%	23%	16%	57	15%	91%
51%	21%	24%	6%	166	20%	73%
7%	6%	7%	0%	10	15%	90%
96%	38%	55%	29%	373	64%	73%
80%	54%	53%	42%	28	24%	100%
24%	1%	13%	1%	29	24%	55%
1%	0%	1%	0%	4	2%	0%
0%	0%	0%	0%	53	15%	4%
47%	5%	31%	1%	103	13%	50%
55%	47%	65%	22%	49	20%	67%
1%	2%	3%	1%	127	35%	87%
95%	1%	26%	0%	51	16%	12%
2%	0%	0%	0%	0	0%	0%
1%	3%	4%	0%	18	12%	78%
13%	1%	9%	0%	19	42%	68%
87%	77%	64%	43%	3	14%	100%
43%	15%	34%	3%	4	15%	100%
91%	0%	38%	0%	21	38%	0%
38%	35%	22%	15%	321	51%	30%
100%	100%	71%	71%	0	0%	0%
5%	100%	100%	5%	54	51%	69%
71%	93%	54%	41%	24	41%	100%
5%	5%	5%	1%	11	6%	36%
99%	4%	81%	3%	24	33%	79%
98%	12%	11%	1%	432	33%	97%
4%	9%	9%	4%	4	25%	50%
59%	39%	28%	10%	395	46%	54%
92%	13%	35%	5%	255	22%	98%
0%	0%	0%	0%	5	71%	0%

1							
2	78%	17%	86%	15%	66	41%	100%
3	0%	0%	0%	0%	2324	66%	96%
4	0%	0%	0%	0%	181	92%	48%
5	0%	0%	0%	0%	0	0%	0%
6	0%	0%	0%	0%	0	0%	0%
7	93%	29%	13%	7%	9	2%	78%
8	0%	0%	0%	0%	0	0%	0%
9	90%	75%	7%	6%	235	78%	43%
10	3%	24%	5%	0%	80	59%	23%
11	11%	6%	0%	0%	306	46%	22%
12	2%	62%	54%	1%	61	64%	59%
13	60%	70%	18%	11%	1246	73%	93%
14	0%	0%	0%	0%	0	0%	0%
15	93%	93%	73%	69%	170	89%	98%
16	55%	39%	5%	4%	212	61%	83%
17	100%	96%	99%	95%	22	81%	100%
18	38%	49%	23%	4%	70	40%	66%
19	26%	21%	0%	0%	5	38%	60%
20	39%	3%	2%	0%	104	50%	79%
21	9%	3%	1%	0%	56	31%	13%
22	74%	11%	11%	5%	39	41%	28%
23	0%	28%	24%	0%	3	38%	33%
24	17%	17%	0%	0%	2	13%	100%
25	73%	47%	29%	16%	4	21%	75%
26	41%	19%	8%	5%	35	45%	34%
27	16%	12%	0%	0%	2	7%	50%
28	79%	88%	73%	56%	12	50%	92%
29	66%	47%	16%	10%	8	33%	38%
30	50%	43%	12%	4%	8	42%	88%
31	67%	36%	12%	4%	11	58%	82%
32	81%	21%	1%	0%	4	31%	75%
33	59%	41%	5%	5%	5	42%	80%
34	93%	10%	10%	3%	5	83%	80%
35	63%	26%	26%	6%	4	67%	75%
36	4%	19%	15%	0%	6	100%	100%
37	0%	0%	0%	0%	0	0%	0%
38	0%	0%	0%	0%	1	13%	0%
39	99%	9%	2%	1%	29	31%	100%
40	38%	27%	11%	7%	283	47%	35%
41	41%	45%	29%	13%	2	2%	100%
42	0%	0%	0%	0%	0	0%	0%
43	0%	0%	0%	0%	0	0%	0%
44	89%	19%	4%	0%	9	100%	100%
45	91%	87%	11%	11%	580	31%	76%
46	63%	59%	4%	4%	317	60%	65%
47	84%	89%	6%	6%	1348	88%	96%
48	34%	32%	3%	1%	150	53%	69%
49	47%	47%	33%	7%	5	71%	100%
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7%	23%	8%	3%	300	70%	22%
20%	17%	0%	0%	378	61%	32%
90%	82%	45%	42%	220	76%	45%
6%	99%	11%	1%	198	55%	99%
67%	50%	0%	0%	2	67%	100%
72%	64%	68%	42%	664	75%	77%
99%	98%	29%	28%	153	13%	90%
43%	29%	29%	29%	8	67%	100%
6%	4%	1%	1%	40	93%	95%
6%	8%	2%	0%	57	54%	18%
85%	69%	0%	0%	2	3%	100%
55%	34%	19%	11%	4	18%	75%
100%	50%	50%	50%	3	18%	33%
100%	60%	0%	0%	1	33%	100%
50%	50%	50%	0%	0	0%	0%
99%	38%	26%	14%	178	14%	100%
10%	2%	1%	0%	64	46%	94%
77%	21%	18%	3%	576	77%	94%
0%	0%	0%	0%	0	0%	0%
24%	5%	2%	1%	199	53%	83%
0%	0%	0%	0%	12	4%	25%
98%	96%	31%	31%	17	6%	76%
36%	36%	9%	9%	6	67%	33%
15%	15%	6%	3%	1	4%	100%
71%	60%	13%	9%	16	22%	69%
75%	100%	100%	75%	0	0%	0%
90%	76%	9%	8%	388	38%	77%
97%	25%	1%	0%	312	29%	47%
79%	79%	34%	33%	22	48%	68%
50%	0%	0%	0%	0	0%	0%
36%	30%	20%	17%	32	30%	9%
100%	60%	20%	0%	2	50%	50%
46%	7%	0%	0%	2	5%	100%

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% with CSF oligoclonal bands results	% secondary progressive MS	% primary progressive MS	% progressive relapsing MS	% relapsing- remitting MS	% with DMTs	% of relapsing- remitting with DMTs
35%	6%	7%	2%	66%	46%	100%
14%	6%	2%	2%	92%	85%	100%
0%	0%	0%	0%	0%	78%	0%
0%	0%	95%	42%	5%	58%	0%
8%	8%	8%	8%	92%	0%	0%
7%	15%	10%	3%	83%	57%	87%
0%	4%	14%	4%	46%	71%	0%
0%	23%	3%	2%	86%	88%	83%
33%	7%	4%	3%	69%	45%	85%
0%	0%	0%	0%	0%	80%	0%
69%	0%	17%	13%	83%	70%	100%
0%	0%	0%	0%	100%	67%	0%
0%	4%	0%	0%	88%	42%	89%
32%	8%	5%	1%	88%	39%	95%
32%	14%	7%	2%	84%	74%	89%
0%	12%	6%	2%	89%	6%	0%
44%	16%	7%	2%	86%	62%	82%
71%	9%	6%	4%	79%	67%	90%
24%	13%	2%	1%	89%	53%	100%
0%	7%	6%	0%	88%	58%	0%
13%	3%	2%	1%	96%	64%	98%
29%	15%	7%	3%	86%	72%	88%
31%	14%	4%	2%	79%	74%	91%
43%	14%	14%	2%	80%	63%	88%
86%	10%	2%	0%	92%	80%	97%
0%	5%	9%	0%	85%	36%	41%
44%	3%	5%	0%	90%	66%	100%
32%	9%	7%	0%	89%	71%	90%
33%	0%	0%	0%	0%	71%	0%
75%	11%	7%	7%	85%	26%	0%
81%	5%	7%	0%	80%	48%	93%
41%	13%	6%	3%	84%	68%	84%
0%	0%	0%	0%	100%	100%	0%
0%	0%	0%	0%	0%	35%	0%
75%	3%	0%	0%	92%	83%	92%
0%	5%	3%	0%	81%	81%	92%
25%	4%	3%	1%	79%	68%	81%
71%	26%	7%	1%	87%	66%	75%
0%	0%	0%	0%	0%	44%	0%
1%	23%	7%	1%	87%	73%	82%
7%	19%	10%	1%	75%	49%	70%
0%	14%	0%	0%	71%	57%	0%

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2	8%	13%	7%	1%	79%	45%	53%
3	15%	4%	4%	0%	62%	66%	86%
4	31%	1%	1%	1%	62%	93%	0%
5	0%	0%	0%	0%	0%	3%	0%
6	0%	4%	5%	1%	92%	74%	96%
7	0%	3%	7%	7%	83%	0%	0%
8	51%	14%	6%	0%	74%	70%	94%
9	6%	13%	5%	1%	84%	73%	92%
10	5%	10%	4%	1%	75%	52%	87%
11	44%	4%	16%	0%	75%	61%	100%
12	76%	17%	8%	1%	85%	65%	83%
13	0%	0%	0%	0%	100%	0%	0%
14	56%	10%	12%	2%	66%	44%	63%
15	8%	15%	11%	1%	76%	41%	62%
16	82%	0%	0%	0%	96%	81%	88%
17	3%	0%	1%	1%	47%	21%	100%
18	20%	0%	0%	0%	31%	8%	0%
19	41%	24%	14%	0%	79%	42%	78%
20	2%	11%	6%	1%	87%	22%	94%
21	69%	9%	3%	1%	91%	59%	100%
22	0%	0%	38%	25%	38%	0%	0%
23	0%	0%	0%	0%	0%	0%	0%
24	25%	0%	0%	0%	100%	100%	100%
25	37%	1%	0%	0%	100%	96%	100%
26	0%	0%	7%	4%	86%	100%	0%
27	25%	0%	4%	4%	88%	100%	100%
28	38%	0%	0%	0%	96%	96%	100%
29	13%	5%	0%	0%	84%	95%	0%
30	18%	0%	0%	0%	95%	89%	0%
31	0%	0%	0%	0%	100%	100%	0%
32	0%	0%	0%	0%	92%	100%	100%
33	0%	0%	0%	0%	100%	100%	100%
34	0%	0%	0%	0%	83%	67%	0%
35	67%	0%	0%	0%	83%	100%	100%
36	0%	0%	0%	0%	0%	0%	0%
37	0%	13%	25%	13%	75%	50%	0%
38	3%	7%	3%	2%	88%	96%	100%
39	2%	6%	8%	3%	65%	9%	46%
40	0%	3%	6%	6%	69%	9%	0%
41	0%	0%	2%	1%	98%	38%	0%
42	0%	0%	2%	0%	97%	1%	100%
43	22%	0%	0%	0%	56%	22%	0%
44	26%	7%	7%	4%	80%	52%	81%
45	26%	21%	5%	1%	83%	56%	75%
46	81%	11%	4%	2%	90%	86%	95%
47	10%	12%	8%	6%	84%	46%	66%
48	60%	0%	14%	14%	86%	57%	0%
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2	6%	7%	3%	2%	92%	61%	64%
3	26%	13%	4%	1%	76%	47%	85%
4	18%	10%	6%	2%	79%	78%	92%
5	76%	17%	8%	1%	78%	63%	88%
6	100%	0%	0%	0%	100%	0%	0%
7	71%	14%	7%	2%	82%	57%	76%
8	16%	9%	3%	0%	85%	50%	98%
9	13%	0%	0%	0%	42%	25%	0%
10	48%	0%	0%	0%	58%	35%	75%
11	32%	6%	8%	5%	75%	50%	76%
12	50%	6%	1%	0%	91%	1%	0%
13	25%	0%	14%	5%	68%	32%	0%
14	0%	0%	0%	0%	94%	6%	0%
15	100%	0%	33%	0%	33%	0%	0%
16	0%	0%	100%	100%	0%	100%	0%
17	85%	28%	19%	4%	73%	32%	83%
18	0%	9%	10%	6%	87%	34%	0%
19	14%	17%	16%	3%	73%	66%	82%
20	0%	33%	0%	0%	95%	17%	40%
21	17%	7%	9%	6%	83%	53%	85%
22	0%	23%	15%	7%	80%	8%	71%
23	0%	11%	9%	5%	83%	81%	96%
24	33%	0%	0%	0%	89%	78%	0%
25	0%	19%	8%	0%	73%	92%	100%
26	6%	8%	12%	8%	77%	55%	0%
27	0%	0%	0%	0%	0%	33%	0%
28	26%	8%	6%	3%	77%	49%	83%
29	64%	6%	6%	2%	76%	61%	95%
30	18%	4%	7%	2%	85%	65%	100%
31	0%	0%	0%	0%	100%	0%	0%
32	50%	2%	4%	2%	89%	47%	100%
33	100%	0%	0%	0%	75%	0%	0%
34	100%	0%	0%	0%	0%	0%	0%
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				Patients treated with:				
mean % of recorded time on DMTs	% of recorded time on DMTs SD	% of recorded time on DMTs CoV	Pegylated					
			Interferon β-1a IM	Interferon β- 1a IM	Interferon β- 1b	Interferon β- 1b (generic)	Interferon β- 1a SC	
64%	46%	71%	28	0	11	0	67	
90%	39%	43%	6	0	48	0	51	
74%	38%	52%	0	0	0	0	7	
80%	74%	92%	0	0	0	0	13	
0%	0%	0%	0	0	0	0	6	
62%	45%	72%	40	0	10	0	36	
72%	43%	60%	0	0	1	0	21	
78%	39%	50%	0	0	0	0	55	
55%	44%	79%	20	0	19	0	88	
75%	43%	58%	3	0	0	0	19	
72%	43%	61%	4	0	6	0	7	
82%	50%	61%	0	0	0	0	0	
57%	43%	77%	7	0	11	0	7	
73%	43%	60%	50	0	37	0	24	
55%	42%	77%	77	0	132	0	124	
51%	19%	36%	5	0	2	0	5	
57%	44%	76%	46	6	73	0	114	
62%	44%	71%	16	1	33	0	18	
83%	48%	57%	28	0	37	0	8	
76%	47%	63%	11	0	5	0	19	
76%	44%	58%	20	1	91	0	30	
64%	43%	67%	83	2	139	0	102	
68%	42%	62%	34	0	39	0	48	
55%	44%	80%	50	0	43	0	52	
75%	40%	54%	23	6	65	0	21	
21%	39%	187%	3	0	12	0	16	
84%	45%	53%	4	0	7	0	6	
60%	40%	67%	12	0	10	0	6	
74%	43%	58%	0	0	1	0	3	
55%	40%	72%	3	0	1	0	0	
65%	47%	71%	3	2	8	0	0	
64%	44%	68%	164	2	88	0	161	
32%	0%	0%	0	0	0	0	0	
34%	45%	131%	13	0	19	0	5	
71%	35%	50%	16	0	8	0	6	
68%	42%	62%	35	0	16	0	44	
52%	42%	82%	19	0	5	0	18	
42%	42%	100%	88	0	220	0	372	
72%	48%	67%	2	0	1	0	4	
56%	41%	73%	238	0	132	0	299	
41%	42%	101%	116	0	110	0	153	
43%	36%	84%	2	0	1	0	0	

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2	22%	29%	134%	18	0	54	0	20
3	60%	44%	73%	994	0	603	0	805
4	88%	26%	30%	41	0	48	0	47
5	58%	18%	30%	2	0	3	0	8
6	55%	40%	73%	118	0	88	0	167
7	0%	0%	0%	0	0	0	0	0
8	66%	42%	63%	28	0	76	0	99
9	66%	41%	63%	19	0	28	0	39
10	62%	43%	70%	118	0	164	0	93
11	68%	44%	64%	17	0	7	0	30
12	58%	42%	73%	231	0	364	0	397
13	0%	0%	0%	0	0	0	0	0
14	38%	41%	108%	27	0	13	0	24
15	33%	38%	117%	67	0	39	0	29
16	67%	34%	51%	3	0	9	0	5
17	40%	30%	74%	14	0	9	0	16
18	9%	26%	280%	0	0	0	0	0
19	32%	42%	129%	32	0	10	0	41
20	60%	36%	59%	27	0	9	0	29
21	57%	39%	68%	22	0	13	0	19
22	0%	0%	0%	0	0	0	0	1
23	0%	0%	0%	0	0	0	0	0
24	86%	16%	19%	6	0	2	0	0
25	86%	22%	26%	9	0	12	0	24
26	96%	22%	23%	3	0	0	0	0
27	87%	17%	20%	11	0	1	0	2
28	92%	21%	22%	0	0	1	0	1
29	95%	28%	29%	2	0	3	0	1
30	80%	36%	45%	4	0	2	0	1
31	98%	4%	4%	3	0	1	0	0
32	83%	23%	28%	5	0	3	0	3
33	94%	6%	7%	1	0	0	0	0
34	99%	51%	52%	1	0	1	0	0
35	63%	17%	27%	2	0	1	0	3
36	0%	0%	0%	0	0	0	0	0
37	21%	48%	232%	1	0	2	0	1
38	85%	27%	32%	22	0	36	0	29
39	20%	21%	104%	35	0	3	0	20
40	40%	24%	60%	16	0	0	0	7
41	76%	47%	62%	469	0	357	0	258
42	23%	7%	30%	120	0	102	13	50
43	15%	27%	173%	1	0	0	0	0
44	42%	39%	94%	302	0	200	0	407
45	47%	40%	86%	82	0	70	0	180
46	64%	34%	54%	465	0	218	0	850
47	43%	41%	95%	44	0	24	0	68
48	79%	50%	64%	1	0	1	0	2
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2	33%	40%	120%	95	0	52	0	62
3	57%	43%	76%	151	4	96	0	92
4	69%	39%	56%	101	0	9	0	116
5	60%	43%	71%	86	0	51	0	105
6	0%	0%	0%	0	0	0	0	0
7	32%	37%	117%	129	0	66	0	205
8	71%	45%	63%	176	0	198	0	123
9	46%	45%	97%	0	0	0	0	4
10	22%	31%	142%	5	0	1	0	7
11	63%	46%	74%	45	0	26	0	1
12	11%	11%	100%	30	0	5	0	4
13	45%	40%	89%	0	0	8	0	2
14	21%	24%	117%	0	0	0	0	2
15	0%	0%	0%	0	0	0	0	0
16	2%	0%	0%	0	0	0	0	0
17	48%	38%	78%	116	0	119	0	231
18	33%	38%	115%	10	0	24	0	13
19	35%	38%	108%	112	1	140	0	211
20	46%	35%	77%	24	0	18	0	29
21	57%	43%	75%	73	0	37	0	89
22	51%	25%	49%	24	0	17	0	10
23	69%	39%	56%	96	0	74	0	115
24	72%	42%	58%	2	0	2	0	2
25	71%	31%	44%	0	0	22	0	0
26	82%	53%	65%	5	0	17	0	17
27	100%	58%	58%	1	0	0	0	0
28	50%	43%	86%	87	0	128	0	224
29	67%	45%	67%	235	0	169	0	216
30	56%	41%	73%	13	0	9	0	8
31	0%	0%	0%	0	0	0	0	0
32	80%	50%	62%	23	0	5	0	12
33	0%	0%	0%	0	0	0	0	1
34	0%	0%	0%	0	0	0	0	0
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Interferon β- 1a SC (generic)	Glatiramer Acetate	Glatiramer Acetate (generic)	Glatiramer Acetate 40mg	Teriflunomide	Dimethyl Fumarate	Fingolimod	Cladribine
0	43	0	0	0	0	1	0
0	24	0	0	0	0	0	0
0	4	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	33	0	0	1	0	14	0
0	0	0	0	0	0	0	0
0	3	0	0	0	0	0	0
0	18	0	0	0	0	3	0
0	1	0	0	0	0	0	0
0	2	0	0	2	0	4	0
0	1	0	0	0	0	0	0
0	9	0	0	1	4	22	0
0	64	0	0	0	9	40	1
0	122	0	5	26	95	322	7
0	1	0	0	0	0	0	0
0	128	0	0	15	60	113	6
0	22	0	0	4	3	14	4
0	15	0	0	3	5	17	0
0	25	0	0	22	40	55	0
0	47	0	0	4	35	162	11
0	120	0	0	8	63	314	22
0	43	0	0	6	37	60	2
0	87	0	0	5	19	78	6
0	109	0	0	30	35	116	6
0	16	0	0	19	19	29	0
0	10	0	0	1	6	60	1
0	4	0	0	2	0	19	0
0	0	0	0	2	7	7	0
0	1	0	0	1	2	6	0
0	12	0	0	4	3	13	0
0	104	0	0	41	17	59	0
0	1	0	0	0	0	0	0
0	9	0	0	0	0	0	0
0	33	0	0	1	0	10	0
0	69	0	0	28	28	43	0
0	13	0	0	0	0	7	0
0	343	0	0	142	59	97	0
0	2	0	0	0	0	0	0
0	267	0	0	47	50	103	0
0	238	0	0	55	56	96	0
0	0	0	0	0	0	1	0

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2	0	5	0	0	0	0	0	0
3	0	591	0	41	61	59	372	0
4	0	63	0	0	3	0	14	0
5	0	5	0	0	0	0	0	0
6	0	85	0	0	2	1	8	0
7	0	0	0	0	0	0	0	0
8	0	51	0	0	0	6	32	0
9	0	40	0	0	2	0	22	0
10	0	98	0	0	0	0	0	0
11	0	19	0	0	0	17	1	0
12	0	274	0	0	29	55	269	0
13	0	0	0	0	0	0	0	0
14	0	18	0	0	2	17	15	0
15	0	20	0	0	2	12	18	0
16	0	11	0	0	5	4	5	0
17	0	9	0	0	0	0	0	0
18	0	1	0	0	0	0	0	0
19	0	18	0	0	0	0	0	0
20	0	12	0	0	0	2	2	0
21	0	18	0	0	1	12	8	0
22	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
25	0	7	0	0	0	0	1	0
26	0	32	0	0	0	0	0	0
27	0	0	0	0	0	0	1	0
28	0	4	0	0	0	0	3	0
29	0	2	0	0	0	0	7	0
30	0	4	0	0	0	0	0	0
31	0	1	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0
34	0	5	0	0	0	0	2	0
35	0	1	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0
37	0	5	0	0	0	0	2	0
38	0	1	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
41	0	2	0	0	0	1	0	0
42	0	1	0	0	0	0	0	0
43	0	1	0	0	0	0	0	0
44	0	1	0	0	0	0	0	0
45	0	24	0	0	0	0	0	0
46	0	3	0	0	0	0	0	0
47	0	9	0	0	0	0	0	0
48	0	50	0	0	0	0	76	0
49	28	3	5	0	0	0	1	0
50	0	1	0	0	0	0	0	0
51	0	297	0	0	38	32	191	0
52	0	89	0	0	6	13	24	0
53	0	295	0	0	6	0	116	1
54	0	41	0	0	1	0	1	1
55	0	2	0	0	0	0	0	0
56								
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2	0	137	0	0	1	0	5	0
3	0	107	0	0	1	33	25	0
4	0	58	0	0	3	3	49	0
5	0	64	0	0	4	7	39	0
6	0	0	0	0	1	0	0	0
7	0	267	0	0	1	3	43	0
8	0	10	0	0	44	36	230	0
9	0	0	0	0	0	0	0	0
10	0	2	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	5	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
19	0	1	0	0	0	0	0	0
20	0	129	0	0	0	0	24	0
21	0	9	0	0	0	0	0	0
22	0	145	0	1	7	12	32	0
23	0	19	0	0	0	0	0	0
24	0	99	0	0	6	2	24	0
25	0	12	0	0	0	9	9	0
26	0	31	0	0	0	0	1	0
27	0	1	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	8	0
30	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0
32	0	159	0	0	34	18	69	0
33	0	190	0	0	20	22	137	2
34	0	7	0	0	0	0	6	0
35	0	0	0	0	0	0	0	0
36	0	33	0	0	0	1	5	0
37	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0
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				Autologous Hematopoietic Stem Cell Transplantation	DMTs represented	Randomised Clinical Trial
Mitoxantrone	Natalizumab	Rituximab	Alemtuzumab			
6	2	0	0	0	7	0
4	2	0	0	0	6	0
1	0	0	0	0	3	0
0	0	0	0	0	1	0
1	0	0	0	0	2	0
11	2	0	0	0	8	0
0	0	0	0	0	2	0
0	0	0	0	0	2	0
3	0	0	0	0	6	0
0	0	0	0	0	3	0
0	3	0	0	0	7	0
0	2	0	0	0	2	0
1	27	0	0	0	9	0
0	29	0	2	3	10	1
68	199	7	7	8	14	31
0	2	0	0	0	5	0
3	86	0	0	2	12	4
1	15	0	0	0	11	4
5	6	0	1	0	10	0
0	40	0	0	0	8	0
13	88	4	0	0	12	11
31	190	2	2	1	14	22
1	44	0	0	0	10	0
13	80	0	0	1	11	0
0	44	0	0	0	10	0
0	39	0	0	0	8	0
0	58	0	1	0	10	0
1	10	0	1	0	9	0
0	1	0	0	0	6	0
0	3	0	0	0	7	0
0	13	3	0	0	9	0
23	48	0	0	0	10	13
0	0	0	0	0	1	0
12	0	0	0	0	5	0
0	11	0	0	0	7	0
0	14	0	0	0	8	0
2	4	0	0	0	7	0
70	61	0	0	0	9	0
0	0	0	0	0	4	0
35	61	0	0	0	9	0
20	122	2	2	0	11	0
0	1	0	0	0	4	0

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2	11	0	0	0	0	5	0
3	32	381	36	11	17	13	0
4	0	14	0	0	0	7	0
5	57	0	0	0	0	5	0
6	24	141	0	0	0	9	0
7	0	0	0	0	0	0	0
8	23	24	4	0	0	9	0
9	7	19	2	0	0	9	0
10	10	29	0	0	0	6	0
11	0	12	1	0	0	8	0
12	38	190	4	0	1	11	0
13	0	0	0	0	0	0	0
14	1	8	1	0	0	10	0
15	5	24	1	1	0	11	7
16	0	7	0	0	0	8	0
17	1	0	0	0	0	5	0
18	0	0	0	0	0	1	0
19	0	1	0	0	0	5	0
20	0	18	0	0	0	7	0
21	0	10	0	0	0	8	0
22	0	0	0	0	0	1	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	6	0
25	1	19	0	0	0	3	0
26	0	28	0	0	0	3	0
27	0	24	0	0	0	6	2
28	0	24	0	0	0	5	0
29	0	18	0	0	0	5	0
30	0	17	0	0	0	5	0
31	0	13	0	0	0	3	0
32	0	12	0	0	0	6	0
33	0	6	0	0	0	3	0
34	0	4	0	0	0	3	0
35	0	6	0	0	0	6	0
36	0	0	0	0	0	1	0
37	1	0	0	0	0	5	0
38	0	0	0	0	0	4	0
39	24	1	5	0	0	7	0
40	1	6	0	0	0	5	0
41	93	0	0	0	0	6	0
42	5	0	0	0	0	9	0
43	0	0	0	0	0	2	0
44	114	130	0	0	0	9	1
45	30	35	1	0	1	11	1
46	67	115	3	0	0	10	0
47	19	3	0	0	0	9	0
48	0	0	0	0	0	4	0
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2	15	28	0	0	0	8	5
3	26	10	0	0	1	11	0
4	23	54	0	0	0	9	0
5	15	35	0	0	0	9	0
6	0	0	0	0	0	1	0
7	51	79	3	0	0	10	0
8	5	212	10	0	0	10	0
9	0	0	0	0	0	1	0
10	0	0	0	0	0	4	0
11	2	0	0	0	0	4	0
12	2	0	1	0	0	6	0
13	0	0	0	0	0	2	0
14	0	0	0	0	0	1	0
15	0	0	0	0	0	0	0
16	0	0	0	0	0	1	0
17	0	0	0	0	0	1	0
18	0	0	0	0	0	1	0
19	30	4	0	0	0	7	38
20	5	4	0	0	0	6	0
21	29	118	0	0	0	11	0
22	2	26	0	0	0	6	0
23	5	26	0	0	0	9	0
24	1	12	0	0	0	8	0
25	1	19	0	0	0	7	0
26	0	0	0	0	0	4	0
27	1	2	0	0	0	3	0
28	0	5	0	0	0	5	0
29	0	0	0	0	0	1	0
30	17	37	0	0	0	10	4
31	13	37	0	0	0	10	0
32	0	0	1	0	0	6	0
33	0	0	0	0	0	0	0
34	1	22	5	0	0	9	0
35	0	0	0	0	0	1	0
36	0	0	0	0	0	0	0
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adverse events (count)	% females pregnant	errors	error rate (per 100 patient- years)
0.08	17%	232	52.2
0.11	8%	19	3.3
0.06	0%	11	22.4
0.03	9%	2	5.3
0.00	0%	4	0.0
0.08	21%	25	3.9
0.24	42%	8	24.4
0.00	0%	38	17.5
0.00	0%	58	6.1
0.00	0%	0	0.0
0.02	0%	3	3.2
1.61	50%	0	0.0
0.01	2%	11	6.2
0.65	38%	77	14.3
0.10	29%	131	2.8
1.37	10%	3	102.8
0.63	18%	39	1.8
0.05	19%	8	2.7
0.23	28%	45	12.5
0.44	3%	17	10.4
0.28	22%	19	1.3
0.18	54%	55	1.4
0.24	32%	48	6.5
0.15	10%	55	3.3
0.02	37%	41	3.0
0.01	0%	8	0.7
0.46	7%	44	19.5
0.27	19%	5	1.8
0.11	0%	1	5.4
0.84	11%	4	24.0
0.05	34%	18	7.9
0.07	10%	124	2.8
0.00	100%	0	0.0
0.00	0%	24	20.6
0.03	2%	6	2.6
0.01	8%	37	5.0
0.00	16%	6	1.5
0.22	100%	59	0.4
0.29	0%	7	20.6
0.04	19%	118	1.5
0.01	8%	92	1.4
1.18	0%	0	0.0

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2	0.06	8%	18	1.5
3	0.02	24%	251	1.0
4	0.04	10%	49	9.0
5	0.00	0%	5	145.4
6	0.00	0%	14	0.6
7	0.00	4%	2	0.0
8	0.05	27%	53	2.9
9	0.05	35%	24	2.6
10	0.00	12%	74	2.6
11	0.10	18%	17	3.9
12	0.02	21%	152	1.2
13	0.00	0%	0	0.0
14	0.08	14%	18	2.6
15	0.03	81%	56	3.0
16	0.09	19%	2	1.7
17	0.01	2%	15	11.5
18	0.00	0%	2	15.7
19	0.00	1%	13	2.5
20	0.18	50%	13	5.0
21	0.15	14%	16	8.4
22	0.00	0%	11	0.0
23	0.00	13%	7	0.0
24	0.26	20%	1	1.6
25	0.08	10%	4	1.2
26	0.08	0%	5	10.0
27	0.25	27%	5	2.9
28	0.48	0%	8	15.3
29	0.15	18%	7	26.6
30	0.27	6%	5	17.1
31	0.18	0%	2	7.1
32	0.24	9%	3	4.5
33	0.80	0%	0	0.0
34	0.14	0%	1	7.2
35	0.16	0%	3	7.8
36	0.00	0%	0	0.0
37	0.00	0%	1	2.5
38	0.01	14%	16	2.5
39	0.02	0%	234	41.5
40	0.76	0%	19	205.3
41	0.00	0%	94	5.2
42	0.00	0%	4	3.6
43	0.00	0%	0	0.0
44	0.03	10%	337	2.8
45	0.10	26%	60	1.7
46	0.13	31%	220	1.6
47	0.19	12%	22	1.7
48	0.00	0%	1	16.6
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2	0.04	4%	42	1.0
3	0.13	6%	28	1.0
4	0.06	18%	58	3.0
5	0.01	16%	48	2.7
6	0.00	0%	0	0.0
7	0.04	16%	140	2.1
8	0.01	7%	42	2.2
9	0.00	0%	6	84.2
10	0.00	11%	103	48.2
11	0.06	0%	7	2.4
12	0.00	5%	0	0.0
13	0.88	0%	12	70.7
14	0.00	7%	0	0.0
15	3.04	0%	0	0.0
16	0.00	0%	0	0.0
17	0.00	4%	18	0.5
18	0.00	23%	22	8.8
19	0.04	25%	161	2.7
20	0.00	1%	4	1.6
21	0.03	21%	85	5.5
22	0.02	18%	78	30.5
23	0.05	24%	102	4.6
24	0.00	0%	1	17.3
25	0.01	0%	7	4.4
26	0.47	7%	16	23.3
27	0.00	0%	0	0.0
28	0.06	90%	305	8.6
29	0.12	63%	85	2.5
30	0.11	31%	4	2.0
31	0.00	0%	0	0.0
32	0.06	0%	4	2.3
33	0.00	0%	0	0.0
34	0.00	0%	0	0.0
35	0.00	0%	2	0.0
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199x139mm (300 x 300 DPI)

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Author/s:

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Title:

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Date:

2017-04-01

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