



# **Manual of Procedures (MOP) for Italian Multiple Sclerosis and Related Disorders Register**

**Protocol Number: SM001 e SM002**

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2.0	24/02/2023	All	Update of Chapters

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## **1 INTRODUCTION TO THE MANUAL OF PROCEDURES**

### **1.1 Purpose**

A Manual of Procedures (MOP) is a handbook that guides a study's conduct and operations. It supplements the study protocol by detailing the organization of the study, operational data definitions, recruitment, screening, enrollment, follow-up procedures, data collection methods, data flow, case report forms (CRFs), and quality control procedures. The purpose of the MOP is to facilitate consistency in protocol implementation and data collection across participants and clinical sites. Procedures in the MOP should be followed with the same degree of vigor as those documented in the protocol. The use of the MOP increases the likelihood that the results of the study will be scientifically credible and provides reassurance that participants' safety and scientific integrity are closely monitored.

This MOP is a reference document for policies and procedures related to the study entitled "Italian Multiple Sclerosis and Related Disorders Register". All staff members participating in the conduct of this study at participating institutions should have ready access to the MOP and be familiar with its contents.

The current version of the MOP is available on the website of the project at <https://registroitalianosm.it/index.php?page=docprogetto>.

The archive of the related documents and previous versions is available on a reserved section of the study website, available on request.

### **1.2 Updating**

The MOP is a dynamic document that will be updated throughout the conduct of a study to reflect any protocol or consent amendments, as well as the refinement of the CRFs and study procedures. All clinical sites will receive a notification when the MOP will be updated and will be available on the study website.

## **2 ADMINISTRATIVE**

### **2.1 Study Leadership Structure**

#### **2.1.1 Organizational Chart**

The "Italian Multiple Sclerosis and Related Disorders Register" study is sponsored by the Research Unit "FISM – UNIBA" directly involved in all the phases of the study. The governance of the "Italian Multiple Sclerosis and Related Disorders Register" includes the following:

- Executive Committee;
- Scientific Committee (SC);
- Technical and Administrative Infrastructure (TAI–SAC, Struttura Amministrativa e di Coordinamento) coordinated by FISM;
- Technical Methodological Structure (TMS–STO, Struttura Tecnico Operativa), based at Mario Negri Institute IRCCS;
- Participating Centers Committee.

Moreover, the study recognizes the importance of having stakeholder advisory boards, including one of pharmaceutical companies (Almirall, Merck Serono, Novartis, Roche, Sanofi, Teva, Viatris, Biogen, Bristol Meyers Squibb, Alexion and Sandoz), providing their inputs and suggestions.

### 2.1.2 Roles and Responsibilities

The roster of contact persons is listed below:

Role/Institution	Name	e-mail	Issues
Sponsor Representative	FISM - Battaglia	m.a.battaglia@aism.it	Fund for the study
Executive Committee	FISM - Battaglia UniBA - Trojano	m.a.battaglia@aism.it maria.troiano@uniba.it	Organizational and administrative role
Scientific Committee	Trojano	maria.troiano@uniba.it	Scientific overview
Technical and Administrative Infrastructure (TAI)	Ponzio	michela.ponzio@aism.it registroitalianosm@aism.it	Study and centers coordination, research assistance and administration
Technical Methodological Structure (TMS)	Mosconi	paola.mosconi@marionegri.it smregistro@marionegri.it	Study and centers coordination, monitoring of data quality collection, development of CRFs and Web Application
Data and analysis	Mosconi Lepore Paletta Ponzio D'Ettorre Bosetti	paola.mosconi@marionegri.it vito.lepore@marionegri.it Pasquale.paletta@marionegri.it michela.ponzio@aism.it ing.antonio.dettorre@gmail.com Cristina.bosetti@marionegri.it	Data collection and data analysis, feasibility of research projects
Informatics	Rossi Vitali D'Ettorre Corrado DMSLab	lorenzo.rossi@marionegri.it massimo.vitali@marionegri.it ing.antonio.dettorre@gmail.com donatella.corrado@gmail.com l.marfisi@dmslab.it	Help Desk, eCRFs, Web Application development and management, Website

## 2.2 Executive Committee

The Executive Committee is chaired by FISM and University of Bari (Unità di Ricerca FISM–UNIBA) and is responsible for the overall direction of the study.

FISM and UNIBA are jointly recognized as “Unità di Ricerca FISM - UNIBA”.

### 2.2.1 Roles and Responsibilities

- Responsibility for the general design;
- Allocation of resources based on priorities of competing study demands;
- Review of study progress and implementation of necessary steps to ensure the achievement of study goals;
- Review and response to other general advice and/or recommendations;
- Changes in study procedures as appropriate;

- Relationship with European and International MS registers.

### **2.3 Scientific Committee**

A SC oversees the study. The SC includes clinicians, methodologists, representatives of MS centers, and of the Italian Neurological Society (SIN, Società Italiana di Neurologia). Three representatives of MS centers are elected every 3 years by the network of the centers.

#### **2.3.1 Roles and Responsibilities**

The SC is involved in all the initiatives related to the study, promotes specific strategic projects, approves requests of access to centralized data for further research projects, and elaborates and prepares the operating protocol and the standardized operating procedures to homogenize the study activities of the various participating Centers. Regular meetings of the SC are organized by the Executive Committee. Meeting are chaired by the President of the SC on the basis of an agenda shared among members some days before the meeting. A minute of the meeting is drafted by secretary of SC and then reviewed and approved by SC members.

#### **2.3.2 Members**

- Prof. Maria Trojano (Department of Basic Medical Sciences, Neuroscience and Sense Organs, Aldo Moro University of Bari, Bari, “President”);
- Prof. Mario Alberto Battaglia (Italian Multiple Sclerosis Foundation, Genova, “Vice-president”);
- Dr. Paola Mosconi (Mario Negri Institute IRCCS, Milano);
- Dr. Claudio Gasperini (UOC di Neurologia e Neurofisiopatologia Azienda Ospedaliera S. Camillo-Forlanini, Roma, “Società Italiana Neurologia representative”);
- Prof. Eleonora Cocco (Centro Regionale per la diagnosi e la cura della Sclerosi Multipla ASL8 P.O. Binaghi, Cagliari, “MS centers representative”);
- Prof. Matilde Inglese (Centro per lo studio e la cura della Sclerosi Multipla e Malattie Demyelinizzanti - Dipartimento di Neuroscienze, Riabilitazione, Oftalmologia, Genetica e Scienze Materno - Infantili, Clinica Neurologica - Ospedale Policlinico San Martino (DiNOGMI), Genova, “MS centers representative”);
- Dr. Carla Tortorella (Centro Sclerosi Multipla - Az. Osp. S. Camillo Forlanini, Roma, “MS centers representative”);
- Dr. Marco Capobianco (Centro Sclerosi Multipla, SC Neurologia, AO Santa Croce e Carle, Cuneo, “Secretary”);
- Prof. Maria Pia Amato (Dipartimento NEUROFARBA, Sezione Neuroscienze, Università degli Studi di Firenze. Centro SM Neurologia 1, AOU Careggi, Firenze, “Expert”);
- Prof. Giancarlo Comi (Centro Sclerosi Multipla Casa di Cura Igea, Milano, “Expert”);
- Prof. Massimo Filippi (Centro Sclerosi Multipla - Ospedale San Raffaele, Milano, “Expert”).

### **2.4 Technical and Administrative Infrastructure (TAI) and Technical Methodological Structure (TMS)**

Two methodological and technical Infrastructures lead the study:

- TAI – Technical and Administrative Infrastructure, coordinated by FISM
- TMS – Technical Methodological Structure, based at Mario Negri IRCCS Institute.

### **2.4.1 Roles and Responsibilities**

The TAI – Technical and Administrative Infrastructure – deals with the secretarial functions, the requests for funding to support the infrastructure and the reporting processes in close collaboration with the TMS, the administrative management and the conservation of the assigned sums, the organization of meetings, the promotion and implementation of information and exchange flows between the participants, and any other operational fulfillment that is useful or necessary to ensure the proper functioning of the Research Unit.

TMS – Technical Methodological Structure – is responsible for the technical-operational coordination of the study, data analysis, and management of the central server that hosts the Web Application and the aggregated database, reports to the centers, analysis of quality of data collected, and development of Web Application. The TMS guarantees the connectivity with the centers, back-up activities of the data stored on the server and takes appropriate security measures to protect such data. The TMS coordinates also activities with centers and with Ethical Committees.

The TAI and TMS share a section in the restricted area of the website, where all the data of the participating centers are stored and periodically updated.

### **2.4.2 Members**

#### **TAI - Technical and Administrative Infrastructure**

Dr. Paola Zaratini: FISM Scientific director.

Dr. Michela Ponzio: senior researcher, TAI coordinator.

Dr. Marco Salivetto: researcher, clinical Post-Authorisation Safety Study (PASS) coordinator.

Mrs. Luciana Lunadei and Mrs. Maria Rita Di Fazio: administrative secretary.

Avv. Paolo Bandiera, Dr. Martina Bassi, Dr. Laura De Barbieri: Legal Office.

Dr. Marco Salivetto: monitoring and coordinating PASS from Italian MS and Related Disorders Register project in collaboration with University of Bari, TAI and TMS.

Mrs. Luciana Lunadei: secretary; coordination of the contacts with the clinical centers and research assistants.

Mrs. Maria Rita Di Fazio: administrative secretary.

Avv. Paolo Bandiera, Dr. Martina Bassi, Dr. Laura De Barbieri: managing legal activities across different stakeholders involved in the Italian MS and Related Disorders Register project.

#### **TMS - Technical Methodological Structure**

Dr. Paola Mosconi and Dr. Vito Lepore: senior researchers and TMS coordinators.

Dr. Pasquale Paletta: researcher.

Dr. Lorenzo Rossi (Computer Engineer), Dr. Massimo Vitali (Computer Informatic Technicians), Dr. Antonio D’Ettore (Computer Engineer), Dr. Donatella Corrado (Datawarehouse, Datamining developer, and Web Application developer), DMSLab: database management and updating (iMed-Web Application), data extraction, help-desk activities and online support to participant centres, creation and maintenance of the new web-based management system dedicated to the Register, backup activities.

Dr. Pasquale Paletta and Dr. Antonio D’Ettore: writing of periodical reports, evaluation of indicators, graphic presentation, and statistical analysis.

Dr. Cristina Bosetti, Dr. Claudia Santucci: feasibility of submitted projects (*sub-studies, see 2.7.4*), and statistical analysis of ad hoc projects.

Mrs. Sabrina Bidoli: administrative secretary; coordination of the contacts with the clinical centers and Ethical Committees.

## **2.5 Centers participants committee**

The participant centers are recognized as the “Italian Multiple Sclerosis and Related Disorders Register Centers Group”. The committee of Principal Investigators (PIs) of each center elects every three years 3 representatives who become part of the SC of the study.

### **2.5.1 Roles and Responsibilities**

- Enrollment of eligible patients;
- Collection of Informed Consents;
- Data collection according to the protocol of the study;
- Storage of patients’ documents.

### **2.5.2 Members**

An up-to-date list of participant centers is available on the website of the study: <https://registroidalianosm.it/index.php?page=dettagliocentri>.

## **2.6. Staff and Training**

### **2.6.1 Centers and clinicians**

Each participant center signed and presented the protocol of the study to the pertinent local Ethics Committee for approval.

Centers were required to include all the Multiple Sclerosis (and Related Disorders) cases in the study, to inform patients about the “Italian Multiple Sclerosis and Related Disorders Register”, request their consent to participate, and to transfer a standardized set of data using the Web Application.

Participation in “Italian Multiple Sclerosis and Related Disorders Register” is voluntary both from the neurologist’s and the patient’s side.

Each center is periodically invited to participate to regional or national meetings about the up-to-date of the study.

### **2.6.2 Research Assistants**

In order to increase the quality of the data collected, a group of research assistants has been ad hoc trained for the study with the aim to foster the collection of good quality data in the Italian Multiple Sclerosis centers.

Research assistants work in the study through a collaboration with FISM. To regulate the activities of research assistants at the centers, FISM asks the center to sign a “hospitality agreement” (*Accordo di ospitalità*) and gives the research assistant a mandate to process personal data (*Lettera di incarico al trattamento dei dati personali*).

Each research assistant is allocated to one or more centers, depending on the size and needs of the Multiple Sclerosis clinical center.

Research assistants report daily by e-mail the TMS and the PI about the activities done in the visited center. Research assistants report monthly the all activities to the TMS, and at least three times/year they are involved in meeting to discuss issues on their activities and on data collection. All research assistants receive an ad hoc training on all aspects of the disease and of the protocol, in particular:

- Information about Multiple Sclerosis, Related Disorders and available treatments;
- Study objectives;
- Inclusion/Exclusion criteria;
- Patients visits schedule;



- Screening, treatment, and follow-up;
- Laboratory evaluations;
- Investigator responsibilities;
- Essential document collection and storage;
- Informed consent procedures;
- Web Application;
- Query process.

## **2.7 Policies and Procedures**

### **2.7.1 Data Request Policy**

The data are stored on the dedicated server at the Mario Negri IRCCS Institute in an encrypted form. The Research Unit FISM–UNIBA as “Co-Owner” - together with the network of Centers - has appointed the Mario Negri IRCCS Institute as responsible for the processing of personal data.

### **2.7.2 Publication and Presentation Policy**

The data collected by the study are available according to the Executive Committee and SC.

Each participant center has full access to the data collected in its center.

Each participant center is requested to share with the TAI abstract or articles related to the study; an ad hoc section of the study website is dedicated to the publication/news regarding the study (<https://registroitalianosm.it/index.php?page=documenti>).

For the Type 1 and 2 studies (see 2.7.4) presented to the SC, each PI is requested to declare the policy of publication, according to the number of patients available in each center.

### **2.7.3 Organizational Chart**

Each clinical site will maintain a delegation of responsibilities log in the essential documents binder. This log associates investigator and/or clinical site staff names with specific study responsibilities. In particular, each center signs a specific document where the clinical center delegates the Italian Multiple Sclerosis and Related Disorders Register Infrastructure (Operating unit) to work for the study (*Mandato di adesione*). In addition, FISM asks the center to manage personal data through an act of appointment as an external person in charge of processing personal data (*Atto di nomina per responsabile esterno dei dati personali*).

### **2.7.4 Data for specific sub-studies**

Data of the study are available to the participant centers for specific sub-studies. A standardized process for applications for research study has been developed. The applications are submitted through the website (<https://www.aism.it/bandiregistro>) after the registration of the responsible of the study. Through the FISM’s website, each participating center can propose research studies addressing one of the high priority areas of the “Italian Multiple Sclerosis and Related Disorders Register”. All the sub-studies are discussed by the SC before their acceptance. The submissions of sub-studies to the SC of the “Italian Multiple Sclerosis and Related Disorders Register” can be made at any time of the year and will be evaluated in the first meeting of the Committee. It is possible to present two different types of sub-studies to the SC of the “Italian Multiple Sclerosis and Related Disorders Register”:

- Type 1: studies promoted and coordinated by the SC, on its the spontaneous initiative or proposed by Centers/Institutions (public or private), in which all the Centers belonging to the “Italian Multiple Sclerosis and Related Disorders Register” will participate by right and obligatorily contributing with the “minimum dataset” (MDS).

- Type 2: collaborative studies between two or more clinical centers related to specific data sets, always within the MDS.

Firstly, the feasibility of proposals (i.e. variables availability, data completeness, sample size, methodological appropriateness etc.) is assessed by the TMS. Then, the members of the SC assess the proposals according to the scientific quality, the value of the study, and the alignment with priority areas of the study.

After the SC approval, the proponent center receives by the TAI a letter with its communication and (if available) suggestions by the SC, together with an agreement form for the use of the data. After the signature of the agreement, data are uploaded in a protected area of the Register's website, and the responsible of the study is informed by e-mail. Through a specific temporary password, the proponent enters the protected area and downloads the file with the data.

All datasets sent are anonymous, the data are selected by macro area according to the project selection criteria.

### **3 REGULATORY**

#### **3.1 Regulations and Regulatory Bodies**

This observational study is compliant with human subjects' regulations. Particularly, the study is conducted according to the AIFA Determination, 20<sup>th</sup> March 2008.

##### **3.1.1 Informed Consent/Assent Process**

Informed consent is required for all subjects participating in the study. In obtaining and documenting the informed consent form, the investigator should comply with applicable regulatory requirements. Prior to the beginning of the study, the investigator must have the Ethic Committee's (EC) written approval for the protocol, and favorable opinion of the informed consent process and written form(s) and any other written information to be provided to the subjects.

The following different consent forms are used for the study:

<b>Adults</b> consent forms	To be delivered and signed to each eligible adult patient
<b>Parent or Guardian</b> consent forms	To be delivered and signed to parent/guardian of each eligible patient under 18 years old
<b>Under 12 years old</b> consent forms	To be delivered to each eligible patient under 12 years old
<b>12-18 years old</b> consent forms	To be delivered to each eligible patient 12-18 years old

In each participant centers, all informed consent forms properly filled and signed are filed in a dedicated binder. Original, or a copy, of consent forms is stored only in the participating center; the TAI and the TMS do not receive any copy of this document.

After having collected the consent forms, clinicians of participant centers must fill-in an appropriate field on the Web Application CRF.

Currently, those documents are available in three languages according to centers' needs: Italian, English and German.

##### **3.1.2 Re-consenting for Protocol Changes or Safety Updates**

If a consent document is revised due to changes in study procedures, subjects who were enrolled prior to the change, but are affected by the change, will be informed and will sign the amended

consent document. If a consent document is revised due to changes in the risks or safety of the study, all active participants must sign the revised consent.

### **3.1.3 Privacy Rule**

A detailed document about the privacy of data collected “Informativa e manifestazione di consenso al trattamento dei dati personali ai sensi dell’Art. 13 del Reg. UE 2016/679” (Versione n. 3 – 25/02/2021) accompanies the informed consent form. People with Multiple Sclerosis sign this document before entering the study.

A PIA - Privacy Impact Assessment - document of the study has been prepared jointly by FISM and the TMS. The final version has been signed in October 2020.

## **3.2 Essential Documents**

Essential documents are those that individually and collectively permit evaluation of both the conduct of a clinical study and the quality of the data produced. Paper versions of non-subject specific site documents will be filed in the study-specific Essential Documents binder.

### **3.2.1 Required Documents**

The following essential documents must be retained at the study site, must be accurately maintained, and may be verified.

Site-specific documents:

- The protocol and all protocol amendments;
- All versions of EC approved consent documents;
- EC documentation, approvals, and correspondence;
- Study communication;
- Delegation of responsibilities log;
- Documentation of clinical research and study training;
- Documentation of clinical site research assistant visits.

Subject-specific documents are not stored at central level. Each participant center has the responsibility to collect and store the following documents:

- Source documents (e.g., lab reports, ECG tracings, X-rays, radiology reports, etc.);
- Signed consent document.

### **3.2.2 Document Maintenance**

The documentation pertaining to this protocol is preserved for 10 years, and the Sponsor permission is required prior to destruction of records.

## **4 SITE QUALITY MANAGEMENT PLANS**

The Register does not provide formal site visits to participating centers. Centers are periodically contacted via e-mail with updates about the progress of the study or the methods of data collection. Annual meetings are scheduled among centers with the aim to present and discuss data collected and quality assessment. Research assistants, on the basis of specific needs related to research studies, carry out formal checks on the data collected.

A set of performance indicators has been identified and adopted with the aim to improve the quality, completeness of the data, generalization and representativeness of the collected data. For every examined indicator or domain, each participating center was assigned a score of 5 for the highest performance, while lower scores of 4 to 1 were attributed for progressively lower performance. Every six months, each participating center receives a report where data and

performance indicators of its own center are benchmarked with the whole sample, so that each center can assess the most critical performances and the level of improvement with time.

## **5 PROTOCOL IMPLEMENTATION**

### **5.1 Recruitment, Screening, and Enrollment**

#### **5.1.1 Recruitment Methods**

Each participant center recruits patients according to its clinical activity.

Some of the participating centers started their data collection in 2000, in the framework of the Italian Multiple Sclerosis Database Network (MSDN). This network used the iMed© software system, progressively replaced by a web-based system, developed ad hoc for the study: the Web Application.

#### **5.1.2 Informed consent**

Each eligible patient enrolled is required to sign a written informed consent form to enter the “Italian Multiple Sclerosis and Related Disorders Register”. Since in some of the participant centers data were collected before the starting of the “Italian Multiple Sclerosis and Related Disorders Register” (through iMed© or other data-entry), according to the local laws and regulations, data collected retrospectively can also be included.

#### **5.1.3 Establishing Eligibility**

Patients eligible for the study are:

- those with a diagnosis - or a possible diagnosis - of Multiple Sclerosis and Related Disorders;
- those diagnosed with Clinically Isolated Syndrome (CIS), i.e. neurological episode (symptom or sign), lasting at least 24 hours, that it is compatible with a demyelinating disease of the central nervous system;
- those with diseases from the Neuro Myelitis Optic Spectrum Disorder (NMOSD) and those associated with the presence of anti-MOG antibodies (MOGAD).

Physicians refer to the McDonald criteria for the Multiple Sclerosis diagnosis.

#### **5.1.4 Assigning Participant Center Identification Numbers**

Each center is identified by a code (2-letter and 3-numeric) attributed uniquely by the TAI.

### **5.2 Enrollment Procedures**

For each center, the TMS records the information related to the PI in the Web Application, enabling him/her to access the Web Application. The software automatically sends an e-mail to the PI confirming the registration in the system.

The password assigned to the PI is temporary, must be changed at the first access to the system and has a duration of three months. After three months, the system asks the user to change the access password.

Within each center, the PI can appoint one or more users delegated to input the data of the patients. The names of the authorized persons are communicated via e-mail by the PI to the TMS, which requests the IT support to activate the new accounts, repeating the assignment procedure described above.

To further improve the system security, the following requirements have been implemented:

- password not shorter than 8 characters;
- it is mandatory to change the password when using the system for the first time and every three months thereafter;

- password complexity check: it must contain at least three characters between numbers, upper- and lower-case alphabetic characters as well as special characters;
- no reuse of the last 4 passwords.

Password storage has been implemented with a new, more secure one-way hashing algorithm (*bcrypt*).

## **6 PROCESS RESPONSIBILITIES**

### **6.1 Detailed Description of Study Procedures**

For each patient enrolled, a new form must be filled-in in the Web Application system.

The system assigns a code number to each new patient.

#### **6.1.1 Schedule of Events**

Each patient will be followed according to the clinical center activities.

According to the protocol of the study, a clinical examination every six months and an EDSS assessment as periodic follow-up are requested for each patient.

#### **6.1.2 Side effects**

In the Web Application, a section is dedicated to specific Multiple Sclerosis treatments. For every Multiple Sclerosis drug available on the market in Italy, an assessment of the clinical risk is available with tables indicating tests and schedule to be foreseen during the administration.

A section is also available for collecting adverse events, reporting type, date and drug-adverse event correlation.

#### **6.1.3 Clinical risk management**

In the Web Application, a section is dedicated to the management of the clinical risk associated to the Disease Modifying Therapies (DMTs) available on the market in Italy. This section is created on the basis of the available recommendations from the main regulatory bodies (EMA, FDA and AIFA) and help clinician scheduling all the tests and examinations needed for the administration of a specific DMD.

## **7 DATA MANAGEMENT**

### **7.1 Data Collection Methods**

Data are collected through a web-based system - the Web Application - developed ad hoc for the study, and available at <https://registroitalianosm.it/index.php?page=areariservata>. Each center can enter the data after identification through a personalized password (direct login at <https://registroitalianosm.it/index.php?page=areariservata>).

In the “Italian Multiple Sclerosis and Related Disorders Register”, each patient has a unique valid code identifier, obtained through the patient encrypted fiscal code.

Each patient is assigned to a center.

### **7.2 Source Documentation Requirements**

All source documents should be filled in by the local PI, study coordinator, their assistants or research assistant.

### **7.3 Study Forms**

The SC agreed, by consensus, on a compulsory common MDS of selected information according to the principles of relevance. The MDS ensures the collection of sufficient data for the clinical

characterization of the single patient. The list of the mandatory variables of interest, identified on the basis of the existing guidelines and the recommendations of the SC, ensures:

- participation of a large and representative number of centers;
- easy and simple data collection;
- ability to achieve the maximum completeness and quality of data for each center;
- possible development of linkage procedures with regional information flows of health administrative data (hospital discharges, drug prescriptions, ticket exemptions, registers of patients, outpatient specialist).

No paper data collection is available, copy of the CRF is available on the website of the study <https://registroidalianosm.it/index.php?page=documenti>.

In 2022, the data collection platform was expanded with a new module for patients with Neuromyelitis Optica Spectrum Disorders and Myelin Oligodendrocyte Glycoprotein Antibody-associated Disease. Although they share with MS the autoimmune nature and similar clinical phenotypes, they constitute distinct entities in terms of natural history and disease characteristics. Careful collection of data for these rare diseases will allow the development of clinical and therapeutic management studies over the coming years. Therefore sections were extended, leading to the development of specific features for them and implementing others for MS.

According to the current clinical practice, the following information is requested in the Web Application:

- Identification/Personal data;
- Onset and Diagnosis (Anamnesis);
- Follow-up visits – EDSS, Safety;
- Relapses;
- Adverse events (clinical events);
- Treatments;
- Non-pharmacological treatments;
- Risk assessment;
- Pregnancies;
- COVID-19;
- Co-morbidity;
- Familiar anamnesis;
- Tests and scales;
- Laboratory exams;
- Magnetic Resonance, Liquor, Evoked Potentials;
- EEG, ECG, Blood pressure;
- Eye examination;
- Optical Computerized Tomography.

The following standardized databases are implemented in the Web Application with the aim of harmonization of data collection:

- FarmaDati, a database of Medicines, Parapharmaceutical and Medical Device, <https://www.farmadati.it/>;
- MedDRA, a specific standardised medical terminology, <https://www.meddra.org/>;

- ICD9CM, International Classification of Disease - a nomenclature of diagnoses, trauma, surgical interventions and diagnostic and therapeutic procedures. Each term is associated with a numeric or alphanumeric code;
- EUROCAT, for the input of the congenital anomalies [https://eu-rd-platform.jrc.ec.europa.eu/eurocat\\_en](https://eu-rd-platform.jrc.ec.europa.eu/eurocat_en).

An ad hoc section is dedicated to the collection of data regarding cases diagnosed in subject under 18 years of age, or diagnosed when they were younger than 18. According to the clinical practice, the following information is requested in the Web Application:

- Identification/Personal data;
- Onset and Diagnosis (Anamnesis);
- Follow-up visits – EDSS, Safety;
- Relapses;
- Adverse events (clinical events);
- Treatments;
- Non-pharmacological treatments;
- Risk assessment;
- Pregnancies;
- COVID-19;
- Anamnesis and Risk Factors;
- Tests and scales;
- Laboratory exams;
- Magnetic Resonance, Liquor, Evoked Potentials;
- EEG, ECG, Blood pressure;
- Eye examination;
- Optical Computerized Tomography.

The same information is requested for patients diagnosed with NMOSD and MOGAD, maintaining the different collection for adult patients and under 18 onset patients.

#### **7.4 Data Error Detection and Correction**

Each center has the full responsibility for the data collected.

The research assistants of the study interact with the neurologists in charge of the study and enter the data or review the data collected.

Every six months, each center receives a personalized report with the situation of the center and a document on data quality indicators.

#### **7.5 Data Quality Management**

##### **7.5.1 Data tracking**

A module has been implemented to log all accesses to the database and all operations both in reading and in writing that are performed through the Web Application.

Access logs to individual personal data must follow the rules specified by the Linee guida del Garante. As established by the Linee Guida del Dossier Sanitario (Health Dossier Guidelines), the system keeps track of the following data:

- identification of the person in charge who carried out the access operation;

- date and time of execution;
- identification of the workstation used;
- identification of the patient whose medical record is affected by the access operation by the person in charge;
- type of operation performed on the data (including consultation).

All these records are encrypted in appropriate log files.

### ***7.5.2 Data entry, data editing and updating***

Each authorized center receives a password to enter the system.

The access to the resources available within the portal - personal and clinical data of patients with Multiple Sclerosis; statistical reports on local and national data - is reserved for authorized personnel. Each operator who wants to make his or her contribution must be part of an Italian center participating in the study.

### ***7.5.3 Reporting***

Every six months, each center receives a personalized report with the situation of the center together with data quality indicators.

## **7.6 Data Provided from an Entity Other than the Clinical Site**

As the nature of this study, observational study according with local clinical practice, at the moment are not available standard guideline for the collection of data regarding for example laboratory data or MRI assessment.

## **7.7 Long Term Storage of Case Report Forms**

Considering the nature of this study, location and time of the storage of documents will be maintained by each clinical centers. Administrative data and information about the study will be maintained by the TMS and the TAI for a period of ten years.

## **7.8 Maintaining Data Privacy**

The Web Application 3.0 has been developed using the PHP Laravel framework (framework version 6.20.18 - PHP version 8.0.3), which guarantees protection from the main security risks highlighted by OWASP.

The Web Application 3.0 provides for the storage of data, in accordance with the study protocol approved by the Coordinating center Ethics Committee and the local Ethics Committees. Patient identification information (name, surname and social security number) entered in the Web Application 3.0 is collected on the central server database and made accessible only to authorized healthcare professionals of the participating centers.

In the Web Application 3.0 the personal data sheet is logically separated from the rest of the cards. The Web Application 3.0 was designed and developed with full respect for the privacy of both investigators and patients. In particular, the privacy of patients is guaranteed by associating each of them with a completely anonymous numeric identification code. Data related to personal information of each patient are stored in encrypted form, i.e. encoded with specific cryptographic algorithms whose purpose is to obtain “obfuscated” data, not understandable/intelligible by people not authorized to read them.



### **7.9 Data retention/encryption**

The data collected are stored in encrypted form on the dedicated server at the Mario Negri Institute IRCCS. Personal and clinical data are encrypted as follows:

- use of the cryptographic module of the sw Database, which requires the identification data to be encrypted with a symmetric key of at least 128 bits, different from that used for the encryption of clinical data (also of at least 128 bits). The symmetric keys must be also encrypted, preferably with asymmetric keys of at least 2048 bits;
- commitment of researchers to use equivalent cryptographic algorithms in their studies;
- key management that includes the change of symmetric keys at least every 2 years;
- biennial reviews of cryptographic algorithms based on Ecrypt reports or equivalent.

### **7.10 Storage**

The database for data storage (MySQL 5.7) uses the Binary Log mode which allows to keep a copy of each transaction that makes changes to the database (in practice a continuous incremental over time). This modality allows point-in-time recovery of the database by restoring it up to the last transaction made or up to a certain point. Two procedures are used for this purpose:

- a procedure performed once a week (at 01:00 on Sunday), which performs a complete dump of the database in order to guarantee a starting point for the recovery;
- a procedure in continuous execution that archives in real time every single transaction that makes changes to the database.

Both procedures store the copy of the data on storage located in a building separate from the one where the database resides.

In case of need for recovery, the last complete dump of the database is restored and subsequently all the transactions carried out from the moment of the dump onwards, up to the last archived or until the moment in which it is necessary to restore the state of the database.

All copies made by the two procedures (both full weekly dumps and archived binary logs) are kept for 90 days. This allows to completely restore the database to the state it was in at any point in the last three months, without any loss of information.

### **7.11 Software and hardware configuration of the devices used**

The Web Application does not require any software installation at the participating clinical centers. The server and support-operating environment has the following characteristics:

#### ***Frontend Application***

- Operating System: CentOS Linux release 8.1.1911;
- Programming language: PHP 8.0.3;
- Web server: Apache v. 2.4.37;
- Website protection: certificato SSL/TLS.

#### ***Backend Database***

- Database: Oracle MySql v. 5.7.29

## **8 SITE MONITORING**

The study does not foresee specific monitoring visits. Centers with a research assistant receive periodic visits. The research assistant checks the entered data and enters new data.

## 9 FINAL STUDY

According to the protocol, the study will end in 2025. This date is however indicative and will be subjected to a specific amendment in order to further extend the study.

## 10 APPENDIX A: LIST OF ABBREVIATIONS

AIFA	Agenzia Italiana del Farmaco
CIS	Clinically Isolated Syndrome
CRF	Case Report Form
DMD	Disease Modifying Drug
DMT	Disease Modifying Therapy
EC	Ethic Committee
eCRF	Electronic Case Report Form
ECG	Electrocardiograms
EDSS	Expanded Disability Status Scale
EEG	Electroencephalography
EMA	European Medicines Agency
FDA	Food and Drug Administration
FISM	Fondazione Italiana Sclerosi Multipla
IRCCS	Istituto di Ricovero e Cura a Carattere Scientifico
MDS	Minimum Dataset
MOGAD	MOG antibody disease
MOP	Manual of Procedures
MRI	Magnetic Resonance Imaging
NMOSD	Neuro Myelitis Optic Spectrum Disorder
OWASP	Open Web Application Security Project
PASS	Post-Authorisation Safety Study
PHP	Hypertext Preprocessor
PI	Principal Investigator
SAC	Struttura Amministrativa e di Coordinamento
SOP	Standard Operating Procedure
STO	Struttura Tecnico Operativa
TAI	Technical and Administrative Infrastructure
TMS	Technical Methodological Structure
UNIBA	Università degli Studi di Bari