# TREAT-NMD SMA Core Dataset

Version 2.1

Please see the online version of this specification for up-to-date information and example forms.

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# Introduction

## Video tutorials

### Introduction

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## About

### Scope of the dataset specifications

This dataset specification aims to leave registries as much flexibility as possible for their individual considerations and local requirements, whilst providing clear guidance and precise requirements wherever necessary. Several things are deliberately not restricted by this dataset:

- The dataset does **not** prevent registries from collecting further data. They are free to include any items not listed here.
- The dataset does **not** specify a data collection form. Although example forms are given to illustrate the dataset and provide a starting point for implementation, registries are free to choose the structure and wording for their forms as they see fit. There are often multiple ways to capture some information and registries should identify the best solution for their requirements.
- The dataset does **not** require registries to use a specific storage format or database structure. Although the items and records suggest a structure which is also used in the interactive example forms, registries will usually need to store further data. For example, many questions on a data collection form will have an Unknown option which is important for registries to track form completion, but which is not specified in the dataset. Similarly, it is often helpful to include further questions such as Was an anti-AAV9 antibody test performed? (yes/no) which lead to further questions being shown, even though the yes/no question does not correspond to an item in the dataset.

### Conventions

This document describes the requirements for a registry conforming to the TREAT-NMD core datasets. TGDOC registries *must* inform TGDOC if they are not conforming to any mandatory requirements. Several keywords are used throughout the document to describe these requirements. When set in italics (e.g. *should*), the keywords are defined as follows:

- *must* or *required* or *shall*: specifies an absolute requirement for any registry conforming to this dataset
- *must not* or *shall not*: specifies an absolute prohibition for any registry conforming to this dataset

[1] <https://datasets.treat-nmd.org/introduction/videos#introduction>
[2] <https://datasets.treat-nmd.org/introduction/videos#items>
[3] <https://datasets.treat-nmd.org/introduction/videos#records>

- *should* or *recommended*: specifies a recommendation that conforming registries should generally adhere to, but which may be disregarded if there are valid reasons to do so
- *should not* or *not recommended*: specifies something that conforming registries should generally not do, but this advice may be disregarded if there are valid reasons.
- *may* or *optional*: specifies a possibility which is truly optional and which a registry may freely decide to follow or not

These definitions closely follow the internet standard RFC 2119[4], but use italics instead of upper case to ease reading.

- Individual refers to the registered person with the neuromuscular disease.
- Caregiver refers to the parent or legal guardian who is providing responses on behalf of the individual.
- Clinician refers to any healthcare professional working in clinic (for example physician, physiotherapist) who is providing data on behalf of individuals.
- Patient-reported (PR) registries: all data are collected directly from patients with no data provided by clinicians. Data should be checked/verified wherever possible by the Registry Curator or team (for example by reviewing clinical notes or reports if available).
- Clinician-reported (CR) registries: all data are provided via clinicians with no data collected directly from patients. Data could be entered into the registry directly by the clinicians, or by Registry Curators/other staff after review of clinical notes/reports or other health record systems.
- Dual-reported (DR) registries: Some data in the registry are collected directly from patients, and some data are provided by clinicians as described above.
- In this dataset specification, baseline or baseline entry always refers to the first data recorded for any given item or record, for an individual in the registry. Update refers to any subsequent data entries.

This dataset specification often uses the term collect or capture, for example registries must collect the surgery date. Collecting or capturing some information means including a question in a data collection form (or gathering it by other means) and having the possibility to store and use the information. It does not mean that this information *must* be present for all individuals. Certain things may be unknown to a data provider or may not be applicable in a certain context, and this should not interfere with the collection or usage of any other data.

A **group** is a collection of related items and records; previously called a Section in version 1 of the SMA dataset. Although this specification attempts to present the groups and their components in a logical order, neither the order nor the grouping itself is binding. A registry *may* use the groups and the order provided here as guidance for their data collection forms, but *may* also choose any other grouping or order. This also applies to the order of items within a record (see below for an explanation of items and records).

When this document refers to the ID of an item or record, the ID is set in a monospace font (e.g. `Scoliosis surgery`).

#### Data submission to TREAT-NMD

Schedule: Currently registries are asked to submit data to TREAT-NMD on an ad-hoc basis; when needed to respond to a 3rd party enquiry into the global registry.

Data: Currently registries are only asked to provide aggregate data (e.g. patient numbers, often stratified, against a specified number of data items).

[4] <https://tools.ietf.org/html/rfc2119>

The above conditions may change in the future if we are required to work with patient-level data as part of a specific postmarketing study, but this would not become a universal mandated requirement for all registries.

Method: Currently registries are asked to provide requested data by emailing it in an Excel spreadsheet. This will be made safer and more efficient in future with the development of the Global Registries Platform (GRP).

Identifiable personal data such as the name, address or contact details of registry participants will **never** be requested nor accepted by TREAT-NMD for central submission. If registries choose to collect these data locally they *must* ensure they are stored and processed according to relevant data protection legislation.

## Items

An **item** (also called *data element* in other contexts) describes a single piece of information, for example the date of symptom onset. Often, an item will correspond to a single question in a data collection form. An item has a descriptive yet short name that is unique among all items in this dataset, for example `Symptom onset date`. Items are indicated with the symbol ☑ Note that the item name is not intended to serve as a complete definition of the item as some details may be omitted for brevity. Complete definitions are included underneath each item name.

An **item value** or simply **value** is a piece of information related to a certain individual. For example `2016-05` is a (partial) date which could describe the symptom onset date for an individual. Its precise meaning, for example that it describes the onset of the first symptoms related to the individual's neuromuscular condition, is described by the item it is associated with. An item value may have various formats or representations; for example, this date could be stored in a registrys database in the international format `2016-05`, but entered into their data collection form by selecting the month May and the year 2016 in drop-down menus.

### Inclusion

A **mandatory** item means that designated registries (see below) *must* collect it (that is, include it in their data collection forms and be able to store and provide the data). They are marked within the document as follows:

- CR items are *mandatory* for clinician-reported registries
- PR items are *mandatory* for patient-reported registries
- Dual-reported registries should interpret this based on who reports each item in their registry.

Note that a mandatory item in the dataset does not always correspond to a mandatory field in a data collection form. It is always possible that the data provider does not know the value of a mandatory item. Although registries *should* make appropriate efforts to obtain the data for mandatory items, missing values generally do not preclude any individual's data from being submitted or considered in enquiries.

In addition to the appropriate mandatory items, each registry is encouraged to collect the other items in the dataset if they are relevant and feasible at the local level.

This dataset is not restrictive. Registries in the TREAT-NMD network are independent and as such are free to collect additional data according to their needs or priorities.

### Item types

For each item, this dataset specifies an item type which is one of the following:

- **yes/no**: An item with this type has two possible values: a positive value, often denoted as yes or true, and a negative value, often denoted as no or false. A registry *may* choose any label for the positive/negative

values that are appropriate in the respective context. Depending on the context, a yes/no item may be implemented in a form using radio buttons, a dropdown menu, a checkbox. As noted below, a selection option for unknown values *may* be included.

- **decimal**: A number which may include a decimal point. A decimal item is generally implemented in forms using a text box together with the proper validation. Decimal items always specify a unit or scale, where the unit is generally an SI unit (International System of Units) such as kilograms or centimetres. A registry *may* collect values using different units, but *must* be prepared to convert them to the specified unit for data submission and analysis.
- **integer**: A whole number. An integer item is generally implemented using a text box with proper validation.
- **date**: A point in time that *must* be captured by registries with a minimum resolution of month and year. Note that TREAT-NMD will only ever request and accept partial dates consisting of a month and year for submission and enquiries. Depending on the item and context, registries *may* collect date items by asking for the individual's age at that time. In this case, either the age can be stored or the age converted to a date using the individual's date of birth. In any case, registries *must* be able to provide dates, but also be able to provide data for queries using ages. A data collection form could use an input box, dropdown menus or a calendar widget for inputting these data. If an input box is used, registries *may* use a localised date format depending on the language and location of the users, for example the format day/month/year for the UK. However, registries *must* be able to provide dates according to the international standard ISO 8601[5] in a format such as year-month-day. Whenever dates are exchanged with TREAT-NMD, this standard will be used.
- **single selection**: For each single selection item, all possible values are listed in this specification. Exactly one of those values *must* be collected (or no value at all). In a form, such items can be implemented using radio buttons or dropdown menus. Not all possible values listed here must be offered to users; registries *may* restrict the options depending on the item and the context. As noted below, a selection option for unknown values *may* be included. Registries *may* choose any order of the values in their data collection forms. Furthermore, the value of a single selection item *may* also be derived and not explicitly asked for, depending on the structure of the form. For example, a form may include separate sections for each type of disease-modifying therapy; then the value of the item `DMT` would not need to be explicitly asked for, but would be determined by which section of the form is filled out.
- **multiple selection**: For a multiple selection item, everything stated for single selection items also applies. However, multiple values may be collected. The order of the collected values is irrelevant, and each possible value may only be provided once. Multiple selection items can be implemented using checkboxes or listboxes.
- **free text**: A string of characters which has no restrictions on its format. Free text fields are usually implemented using text boxes.
- **restricted text**: A string of characters with some restrictions on the format, for example `Country of residence` where the value must be a two-letter country code. The implementation in a data collection form depends on the item and the technical possibilities.

#### Unknown and missing values

For any item, the value may be unknown to the data provider or missing in a registry for another reason (for example, because the form was not yet completed). Therefore, this specification acknowledges that in a TREAT-NMD enquiry or data submission, there may be no value for any item, even if it is mandatory. The precise way to indicate a missing value in a TREAT-NMD enquiry or data submission (for example by leaving

[5] <https://en.wikipedia.org/wiki/ISO_8601>

the cell in an Excel spreadsheet blank) will be specified for each submission.

Since this applies to all items, this dataset contains no explicit values to indicate unknown or otherwise missing values. For this reason, all `Unknown` values have been removed in version 2. However, a registry *may* add a selection option in their data collection forms for an unknown value wherever they deem appropriate. This allows a registry to track whether a data provider does not have a certain piece of information, or has merely not completed the form fully. This is important for data curation, but since curation is performed independently by the local registries, this distinction is not relevant for any analyses of data submitted to TREAT-NMD and is therefore outside the scope of this core dataset.

Wherever registries offer a selection option for an unknown value, any appropriate label may be chosen, for example Unknown or I don't know. To encourage registry users to return and complete any unknown values as soon as possible, registries may also choose to use To be confirmed where appropriate. Moreover, patient-reported registries may choose to include an option I do not wish to disclose for potentially sensitive questions in their data collection forms.

#### Enumerated values

For single selection and multiple selection items, all possible values are enumerated in the dataset specification.

#### Value ID

The value ID is a concise, stable and descriptive text that uniquely identifies a certain value for a certain item. Whenever providing data to TREAT-NMD, the value ID *must* be used. Like an item ID, a value ID is always in English and *must not* be translated into a local language. Furthermore, it is *recommended* that registries use the value IDs provided in the dataset specifications as internal identifiers in their registry platforms as well.

#### Description

The description of a value is sometimes the same as the value ID, but often it is longer in order to provide a precise and more comprehensible definition of the value. Registries *may* use the provided descriptions as labels in their data collection forms, but this is not required. In particular, registries which do not use English forms *should* of course use labels in their respective local language. Furthermore, the descriptions are generally worded for curators and clinicians, so patient-reported registries *should* adapt the wording where necessary to ensure that is easy to undertand for patients and their families.

#### Classification

For some values, the datasets provide a mapping to a classification such as the Human Phenotype Ontology[6] (HPO) or ORPHAcodes[7]. These mappings are provided as a convenience as the clasification may provide further information, synonyms that can be used as labels, and insight into why a certain definition was chosen in the dataset. Note that this mapping is only applies to one direction; i.e., if a certain value applies to a individual, then the mapped term applies, but not necessarily the other way around, because the value in the datset may be more specific than the term in the classification. For example, the item `LGMD type` in the LGMD dataset contains the values `LGMD D5` which denotes a dominant Bethlem myopathy as well as `LGMD R22` which denotes a recessive Bethlem myopathy. However, there exists only one ORPHAcode (ORPHA:610[8]) for Bethlem myopathy, so both values in the dataset are mapped to the same ORPHAcode. If one only knows that

[6] <https://hpo.jax.org/app/>
[7] <https://www.orpha.net/>
[8] <https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=610>

ORPHA:610 applies to a certain individual, the mapping in the dataset does not provide a unique value for the item LGMD type.

### Deprecation

Some values are marked as deprecated since a certain version of the dataset. For example, version 1 of the SMA dataset specified Part-time as a possible value for ventilation duration, while version 2 provides the more fine-grained values Part-time awake and sleeping and Part-time sleeping. Registries who had implemented version 1 of the dataset will have the value Part-time recorded in many cases and this data should be used whenever required. But for collection of new data, it should no longer be provided as a possible option and is therefore marked as deprecated.

### Longitudinal items

Longitudinal items are marked with the symbol Longitudinal For a given patient, many values for a longitudinal item can be collected over time. For each of these values, a datestamp which denotes the date the value refers to (for example, the date of a measurement) *must* be saved. For use in TREAT-NMD enquiries and data submission, it is sufficient that the datestamp has only the month and the year.

An example of a typical longitudinal item is Weight, which should be collected at each visit or registry update. When analysing the data, it is important to know when each weight measurement was made. When performing a registry update, either by the individual themselves or by a clinician after an examination, the date of the measurement will be equal to or approximately equal to the date of the registry update. In such cases, in particular when a data collection form contains questions such as What is your current weight?, a registry *may* automatically set the datestamp of a value to the entry date. If all values of a certain item are known to refer to the date of entry, a registry *may* not explicitly store any value date for this item at all and instead use the entry date whenever a value date is asked for.

However, when historical data is added, in particular at the baseline registration, the date of the measurement may be significantly earlier than the date of the entry. In such cases, registries *must* allow for the date to be entered explicitly.

In an example registry, the weight values may be stored in a table similar to the following one:

| Patient ID | Date | Weight |
|---|---|---|
| 1 | 2015-03 | 38.2 |
| 1 | 2016-04 | 43.8 |
| 2 | 2014-09 | 63.0 |
| 2 | 2016-09 | 61.5 |

For each patient, there exist multiple rows in this table where each row corresponds to one weight measurement.

Further examples of longitudinal items are Scoliosis diagnosis and Cobb angle. For Cobb angle the date of the measurement (that is, the radiology examination) will often be different from the entry date. In the example registry, the values for those items could be stored in the same table:

| Patient ID | Date | Weight | Scoliosis diagnosis | Cobb angle |
|---|---|---|---|---|
| 1 | 2015-03 | 38.2 | no | |
| 1 | 2016-01 | | | 8 |
| 1 | 2016-04 | 43.8 | yes | |
| 2 | 2014-09 | 63.0 | no | |
| 2 | 2016-09 | 61.5 | no | |

For patient 1, the positive scoliosis diagnosis was entered in April 2016. The radiology examination in which the Cobb angle was measured was performed in January 2016. Therefore, the row with the date 2016-01 only has the value of the Cobb angle, while the cells for the other items are blank; and similarly, the other rows have no value for the Cobb angle.

For a clinician-reported registry, the datestamp of a longitudinal value *should* usually be the date when the clinical examination on which the entry is based was performed. Exceptions are noted in the description of some items: For example, the datestamp of the Cobb angle *must* be the date of the radiology examination on which it is based. This is particularly important for baseline entries, when older data may be entered. If the precise date for a value is not available but the year is known, it *may* be specified using only the year. But if no information about a date is known, it *must* be omitted.

For patient-reported registries, the datestamp of a longitudinal value generally *should* be the date of the registry entry, with the same exceptions as for clinician-reported registries.

#### Datestamped items

A small number of items require datestamps, but no historical values; for example `Is family member affected`. Although this item should be collected on every update, only the latest value is relevant. However, it is still important to know when that value was last updated. Such items are called datestamped and marked with Datestamped For any such item, registries *must* save the date on which the value was last updated or marked as up-to-date. As with the datestamp for longitudinal items, only the month and the year are *required* for analysis.

#### Creation and modification timestamps

In addition to the datestamps explicitly required, registries *should* save the date and possibly time of each entry and value modification, ideally together with audit information such as which user performed the change. Registries *should* use a data collection platform which automatically provides this functionality. These timestamps support auditing data entries and ensuring data quality, but may also serve as a fallback if no explicit datestamp is available for a certain value. For example, if a certain value for the item `Cobb angle` has no date set, one at least knows that the date of the examination must be before the date this value was entered. However, this specification currently has no rules on when and how such dates would be used for TREAT-NMD enquiries and registries *must* aim to obtain explicit datestamps for any datestamped or longitudinal item whenever possible.

#### Past and present status

In many cases, both the past and present status is important. For example, registries should capture whether an individual is currently using a feeding tube, and also whether this has been the case in the past. While individuals will usually know both the present and previous status for a condition like this, clinicians may not always have the complete medical records. Furthermore, a registry may change a question from capturing

only the current status (e.g. Are you currently using a feeding tube?) to asking about the past as well (e.g. Have you ever used a feeding tube? with the responses Currently, Previously and No). It should then remain possible to handle the responses to the previous question in a uniform way.

To cover all possible ways to model such an item in a data collection form, several items in this dataset specify the values listed below. Please note, the full list of values for this item is not intended for use in a data collection form and is for data mapping purposes only. Instead, registries generally should only present the options Currently, Previously and Never with suitable user-friendly wording.

| Value ID | Description |
|---|---|
| Currently | This is currently the case |
| Previously | This has previously been the case, but is not currently |
| Never | This has never been the case, neither previously nor currently |
| Sometime | This has been the case at some time, but it is unknown whether it is currently the case |
| Not currently | This is currently not the case, but it is unknown whether it has previously been the case |

The following tables demonstrate how such an item can be implemented in a form and how the possible responses would be mapped to the values above.

In general, registries *should* use example A (with the wording adapted according to the context) for current data collection forms if possible, as it is concise and conveys the most information. Otherwise, examples B or C *should* be used as a basis. If neither of these variants is possible, example D *may* be used.

**Example A: Has this ever been the case?**

| Response | Value |
|---|---|
| Currently | Currently |
| Previously | Previously |
| Never | Never |
| Unknown | [no value] |

**Example B: Has this ever been the case? and Is this currently the case?**

In this variant, the item is collected using two separate yes/no questions which each have an unknown option.

| Response 1 (ever?) | Response 2 (currently?) | Value | Remark |
|---|---|---|---|
| Yes | Yes | Currently | |
| Yes | No | Previously | |
| Yes | Unknown | Sometime | |
| No | Yes | | invalid |
| No | No | Never | |
| No | Unknown | Never | implausible |
| Unknown | Yes | Currently | implausible |
| Unknown | No | Not currently | |
| Unknown | Unknown | [no value] | |

Whenever No is selected for the first question, this *must* be mapped to the value `Never` and the second question *should not* be displayed, thus avoiding invalid or implausible entries. The combination of Unknown for and Yes is implausible as knowing that something is currently the case implies knowing that it has ever been the case; this *should* be avoided by hiding or disabling the option Yes for the second question whenever Unknown is selected for the first.

**Example C: Is this currently the case? and Has this previously been the case?**

This variant is essentially only a minor modification of example B in which ever is replaced by previously and the questions are swapped. The mapping is the same as above, but it is shown here in the modified order for convenience:

| Response 1 (currently?) | Response 2 (previously?) | Value | Remark |
|---|---|---|---|
| Yes | Yes | Currently | |
| Yes | No | Currently | implausible |
| Yes | Unknown | Currently | implausible |
| No | Yes | Previously | |
| No | No | Never | |
| No | Unknown | Not currently | |
| Unknown | Yes | Sometime | |
| Unknown | No | Never | implausible |
| Unknown | Unknown | [no value] | |

The combinations that are considered implausible or invalid in example B are considered implausible here as well (while considering the change in order): The combinations Yes and No as well as Yes and Unknown are marked as implausible because the current state at a given moment will be the past state just a moment later. The combination Unknown and No is deemed implausible because if someone knows that a certain condition never held in the past, then this assessment applies to all moments right up to the current moment and should therefore also apply to the current moment. In electronic data collection forms, these combinations *should* be avoided by only displaying the second question if the reply to the first is not Yes and by hiding the option No in the second question if the reply to the first is Unknown.

**Example D: Has this ever been the case?**

This alternative is similar to example B, but does not contain the question about the current status. As it does not capture as much data as the other variants, it *should* generally be avoided and used only to map previously collected data.

| Response | Value |
|---|---|
| Yes | Sometime |
| No | Never |
| Unknown | [no value] |

**Consistency rules**

The aim of the datasets to avoid redundancy wherever possible. That means that for any piece of information (such as whether the diagnosis of a person has been genetically confirmed) there should generally be only one

item (e.g. the item `Genetic confirmation`). But often, a certain degree of redundancy cannot be avoided. For instance, when details of a genetic confirmation are provided (e.g. in the record `Genetic report` in the SMA and DMD datasets or in the record `Variant` in the LGMD dataset), this already implies that there is a genetic confirmation. But the item `Genetic confirmation` is still important because it should be possible to state that a diagnosis is confirmed even when no details are known. However, this means that the values could contradict each other: Suppose that for a certain individual, a registry submits an instance of the record `Genetic report`, but also `No` as value of `Genetic confirmation`. Does this mean that the genetic report does not actually confirm the diagnosis? Or is the value of `Genetic confirmation` incorrect?

To avoid such ambiguities, the dataset specifications contain consistency rules to exclude invalid data. For example, in the SMA and DMD datasets, the item `Genetic confirmation` has the following rule: "Must be `Yes` in case an instance of the record `Genetic report` is provided.". In most cases, more than one item or record may be related to a rule (in this case, the item `Genetic confirmation` and the record `Genetic report`), but the rule is only specified in one of them. Registries *should* ensure that consistency rules are met at all times through form structure, conditional display rules and input validation (see below). When submitting data to TREAT-NMD, any data that violates any consistency rule may be rejected.

Note that consistency rules are different from the following other rules that are used in registries:

- **Conditional display rules** specify on what conditions certain input fields or parts of a data collection form should be displayed. The dataset specifications do not contain any such rules because they don't mandate any specific form structures. However, in most cases registries can use conditional display rules to enforce consistency rules. In the example above, the consistency rule would be met if the data provider is first asked whether or not there is genetic confirmation. Only if the reply is "Yes", the further input fields for the genetic report are displayed.
- **Input validation rules** specify under which conditions an input from a user is rejected. They are related to a specific data collection form within a specific data collection process. Therefore, the dataset specifications again contain no such rules, but input validation rules can be used to enforce consistency rules.
- **Completeness rules** can be used to determine whether a certain registry entry is complete. For example, when the genetic report details are mandatory (e.g. for a clinician-reported registry), they need to be collected if the diagnosis is genetically confirmed. An according completeness rule would be "If `Genetic confirmation` is `Yes`, then an instance of the record `Genetic report` *must* be provided." Note that this is the converse of the consistency rule. While consistency rules mandate the *exclusion* of data, completeness rules require the *inclusion* of data. The dataset specifications do not contain any such rules as absolute requirements, but rather use the mandatory/non-mandatory status of items and records to indicate which information must be collected by which registries on a best-effort basis. It is always possible that certain information is not available for any reason, but this will generally not lead to other data on the same individual to be rejected.

#### Related items in previous version

There exist previous versions of the SMA and DMD datasets which used item numbers (e.g. 15.10) instead of the descriptive item IDs used here. To aid the transition to the new datasets, all items and records contain references to the numbers of the items in the previous datasets. In many cases, there is a direct correspondence between the old and new items; i.e., they describe the same information. But in some cases, the structure has been changed, so one new item may be related to multiple previous items or vice versa.

The Excel spreadsheet which can be found in the downloads page of each dataset also contains a worksheet "Mapping of previous version". It lists all previous item numbers which have related items in the current dataset

together with their corresponding new item and record IDs.

#### Technical details on IDs

The ID of each item and record serves as a unique and stable identifier. It may only consist of ASCII letters, numbers, spaces and hyphens (to be precise, hyphen-minus signs). When implementing this dataset, registries *should* use the names of this dataset as identifiers in their datasets wherever possible. However, registries *may* also choose to use a variant of the names in which all letters are converted to lower case and spaces as well as hyphens are replaced with an underscore. For example, for the item `Anti-AAV9 antibody test date`, a registry *may* choose `anti_aav9_antibody_test_date` as a database column name or other identifier. Regarding potential future transfer of patient-level data, registries *may* expect that item names transformed in this way will be accepted just as the standard names used in this specification, as long as the transformation is consistent across all items for a given registry.

### Records

For some items, there can be multiple values for one individual in a registry, without the item being longitudinal in nature. For example, the item `Affected family member relation` describes the relation of an affected family member to the individual, but should allow multiple values to be stored; one for each family member. Furthermore, there are other items that also refer to the affected family members: `Affected family member sex` and `Affected family member side`. It is important to capture which values of these three items belong together. Therefore, they are grouped in a **record**, which is simply a collection of related items. Records are indicated with the symbol ☑ For any record, there can be multiple **record instances**, which are collections of item values. In the example above, this would require a record instance for each affected family member. Each record instance would contain three item values; one for each of `Affected family member relation`, `Affected family member sex` and `Affected family member side`.

Just like an item, every record has a descriptive and stable textual ID that is unique among all records in this dataset. However, the IDs of records and items may overlap; i.e., there may exist a record and an item with the same ID.

#### Longitudinal records

While `Affected family member` is a record that captures information on multiple people, but all referring to the current situation, there are other types of records which are longitudinal in nature. For example, for the item `Height` it is important to know what measurement method was used for a height value. In order to make it explicit that the items `Height` and `Height measurement method` all refer to the same measurement, they are grouped in a longitudinal record, marked with Longitudinal Each instance of a longitudinal record *must* include a date which specifies the point in time when, depending on the nature of the record, a measurement was made, an event took place or a certain condition held. The same rules apply as for longitudinal items: Month and year are sufficient, and in many cases, the date of a longitudinal record may be assumed to be equal to the entry date (see above).

#### Episode records

While some records such as `Height` or `Scoliosis surgery` refer to measurements or events which are points in time, other records refer to conditions that hold true over a period of time. In this dataset, such time spans are called episodes and the records are marked with Episode One example is `Feeding tube usage episode`,

where registries should record when an individual started and, if applicable, stopped using a feeding tube in the past. In addition, if a condition currently holds true at the time of an entry, it is important to explicitly record this date as well, which is called the ongoing date in this dataset.

For each episode record, the following dates *must* be captured:

- `Start date`: The date when the condition described by the record started to hold, if known
- `Stop date`: The date when the condition ceased to hold, if applicable and known
- `Ongoing date`: The date on which the condition was known to hold, if applicable; this date generally *may* be assumed to be the date of entry or clinical examination on which the registry entry is based

The following consistency rules apply:

- All three dates *must not* be after the date of entry.
- `Start date` *must not* be after `Stop date` or `Ongoing date`.
- Only one of `Stop date` and `Ongoing date` may be provided; they *must not* both be specified.

#### Reference period records

Some items refer to a specific period of time. For example, a registry may ask about hospitalisations in a form using the question Have you been admitted to hospital in the last 12 months? or Have you been admitted to hospital since the last registry update?. Since the specific time frame may vary from one value or registry to another, and may not always be derivable from the entry date, it is important to explicitly record the time period. In this dataset, records which refer to a period of time are called reference period records and are marked with **Reference period** For every reference period record instance, the following dates *must* be provided:

- `Begin date` specifies the beginning of the reference period.
- `End date` specifies the end of the reference period.

These dates do not refer to any actual event or condition, but only the dates which the question on a form referred to. The terms `Begin` and `End` are deliberately chosen to avoid confusion with the terms `Start` and `Stop` used for episode records. Unless otherwise noted, registries *should* use the following periods:

- At baseline data collection (i.e., when the information this record applies to is first collected for this individual), the time period is the last 12 months. That is, `Begin date` is the date of entry minus 12 months, and `End date` is the date of entry.
- At data updates, the time period is since the last update of this item. That is, `Begin date` is equal to the `End date` of the previous reference period, and `End date` is the date of entry.

The aim is to have a collection of reference periods which are consecutive and non-overlapping.

## Privacy-preserving record linkage

The items in this group are solely for the purpose of generating a privacy-preserving record linkage (PPRL)[9] code, which is a technology that TREAT-NMD aims to utilise in future. They should only be collected and stored locally, and will never be requested by the TREAT-NMD Global Registry for verbatim transfer.

Note that the specification of these items may be changed or refined when a particular system for privacy-preserving record linkage has been adopted by TREAT-NMD.

[9] <https://irdirc.org/activities/task-forces/privacy-preserving-record-linkage/>

### First name at birth

CR PR

**Item type:** free text

**Related items in previous version:** 2.02

**Changes:** In version 1, the first name at birth was to be captured in item 2.02 only when different from the current first name; from version 2.0 on, it must be captured in this item in any case. In version 2.0, this item was made mandatory for all registries.

### Last name at birth

CR PR

**Item type:** free text

**Related items in previous version:** 2.04

**Changes:** In version 1, the last name at birth was to be captured in item 2.04 only when different from the current last name; from version 2.0 on, it must be captured in this item in any case. In version 2.0, this item was made mandatory for all registries.

### Full date of birth

CR PR

Full date of birth of the individual, including the day. The value *may* be taken from an official document such as a birth certificate, passport, identity card, or health insurance card, but *may* also be provided by the individual or their guardian. If the values from any of these sources differ, the value on the birth certificate, or alternatively a different government-issued document, *must* be used.

**Item type:** date

**Related items in previous version:** 2.00

### Sex at birth

CR PR

The sex that was assigned to the individual at birth. If a birth certificate is available, this value *must* match the sex given on the certificate. If the sex at birth is not known, this value *must* be empty. The value `Unspecified` *must* only be used if a birth certificate exists, but has no sex recorded.

**Item type:** single selection

**Related items in previous version:** 2.06

**Changes:** In version 1, the sex assigned at birth was to be captured in item 2.06 only when different from the current sex; from version 2.0 on, it must be captured in this item in any case. In version 2.0, the value `Intersex` was added and this item was made mandatory for all registries.

| Value ID | Description |
|---|---|
| Male | Male |
| Female | Female |

| Value ID | Description |
|---|---|
| Intersex | Intersex |
| Unspecified | There is no sex specified on the pertinent document (e.g. birth certificate, passport or identity card) |

### Country of birth

CR PR

ISO 3166-1 alpha-2[10] two-letter code (e.g. `GB` for the United Kingdom) of the country of birth of the individual.

**Item type:** restricted text

**Related items in previous version:** 2.13

**Changes:** In version 2.0, it was clarified that the ISO 3166-1 two-letter code is to be used and this item was made mandatory for all registries.

### Place of birth

CR PR

City or town of birth.

**Item type:** free text

**Related items in previous version:** 2.14

**Changes:** In version 2.0, this item was made mandatory for all registries.

## Demographics

Please also see the online examples.

### Date of birth

CR PR

Date of birth of the individual, as given on birth certificate or as reported by the individual or their parent. Although registries *must* collect the full date of birth (see the item `Full date of birth`), only the year and month will be requested by the TREAT-NMD Global Registry.

**Item type:** date

**Related items in previous version:** 2.00

### Sex

CR PR

Current biological sex of the individual.

[10] <https://www.iso.org/iso-3166-country-codes.html>

**Item type:** single selection

**Related items in previous version:** 2.05

**Changes:** In version 2.0, the value `Intersex` was added.

| Value ID | Description |
|---|---|
| Male | Male |
| Female | Female |
| Intersex | Intersex |
| Unspecified | There is no sex specified on the pertinent document (e.g. birth certificate, passport or identity card) |

## Country of residence

CR PR

ISO 3166-1 alpha-2[11] two-letter code (e.g. `GB` for the United Kingdom) of the most recent known primary country of residence of the individual.

**Item type:** restricted text

**Related items in previous version:** 2.12

**Changes:** In version 2.0, it was clarified that the ISO 3166-1 two-letter code is to be used.

## Is family member affected

datestamped

Specifies whether any genetically related family member of the individual has received a relevant diagnosis as defined below. As long as the value is `No`, registries *should* ask the data provider at each update to verify if this has changed.

This item refers to a diagnosis of 5q SMA.

**Item type:** yes/no

**Consistency rules:** In case an instance of the record `Affected family member` is provided, the value *must* be `Yes`.

**Related items in previous version:** 2.20

**Changes:** In version 2.0, it was clarified that only genetically related family members are to be considered.

In version 2.1, it was clarified that this item refers to a diagnosis of 5q SMA.

## Affected family member

For each genetically related family member with 5q SMA, an instance of this record *should* be provided specifying the kinship.

**Related items in previous version:** 2.21

[11] <https://www.iso.org/iso-3166-country-codes.html>

**Changes:** In version 2.0, item 2.21 from version 1 was replaced by this record in which the relation, the sex and the sex of the intermediate family member are split into separate items.

In version 2.1, it was clarified that this item refers to a diagnosis of 5q SMA.

#### Affected family member relation

Relation of the affected family member to the individual.

**Item type:** single selection

**Related items in previous version:** 2.21

| Value ID | Description |
|---|---|
| Parent | Parent |
| Sibling | Sibling |
| Half sibling | Half sibling |
| Child | Child |
| Grandparent | Grandparent |
| Grandchild | Grandchild |
| Cousin | Cousin |
| Aunt or uncle | Aunt or uncle |
| Niece or nephew | Niece or nephew |

#### Affected family member sex

Sex of the affected family member. If there is no information on this family member's sex, this value should be left empty (`Unspecified` is for cases in which no sex has been assigned or recorded in the civil registry).

**Item type:** single selection

**Related items in previous version:** 2.21

| Value ID | Description |
|---|---|
| Male | Male |
| Female | Female |
| Intersex | Intersex |
| Unspecified | There is no sex specified on the pertinent document (e.g. birth certificate, passport or identity card) |

#### Affected family member side

Side of the family. For example, for an affected uncle, this value *must* be `Male` if he is the individuals fathers brother and `Female` if he is the individuals mothers brother. For an affected grandchild, this value *must* be `Male` if the grandchild is a sons child, and `Female` if it is a daughters child. For an affected niece, this value *must* be `Male` if she is the individuals brothers child and `Female` for their sisters child. For an affected cousin, this value *must* correspond to the sex of the individuals parent in the relation (for example, if the affected cousin is the niece or nephew of the individuals mother, this value *must* be `Female`).

**Item type:** single selection

**Consistency rules:** If `Affected family member relation` is `Parent`, `Sibling` or `Child`, this value *must* be unspecified.

**Related items in previous version:** 2.21

| Value ID | Description |
|---|---|
| Male | Male (e.g. paternal or fraternal) |
| Female | Female (e.g. maternal or sororal) |
| Intersex | Intersex (the intermediate family member in the relation is an intersex person) |

## Living status

In patient-reported registries, we do not suggest that the individual/caregiver should answer this question. Ideally this item will be managed/entered by the Registry Curator, following review of the registration or communication from individual's family.

### Alive

CR PR datestamped

`Yes` means that the individual was known to be alive at the datestamp of this value. `No` means that the individual is known to be deceased; in this case, the datestamp of this value is irrelevant and *may* be omitted. If known, the date of death is to be provided in the item `Date of death`.

It should not be necessary to store an explicit datestamp for this item. Instead, a registry *may* use the date of the last update or contact with the individual as the datestamp.

**Item type:** yes/no

**Related items in previous version:** 3.00

**Changes:** In version 2.0, the value `Loss of follow-up` was removed. In its place, the item was changed to being datestamped, which allows applying a specific criterion across all registries for judging loss of follow-up (for example, two years after the last contact).

### Date of death

Date of the death of the individual. The date of death *may* be provided as a year only, if the month is not known.

**Item type:** date

**Consistency rules:** May only be provided if the value of `Alive` is `No`.

**Related items in previous version:** 3.01

### Cause of death code

Cause of death as code of the classification specified in `Cause of death classification`.

**Item type:** restricted text

**Consistency rules:** May only be provided if the value of `Alive` is `No`.

**Related items in previous version:** 3.02

**Changes:** As of version 2.0, it is no longer possible to use the ICD-10 chapter headings instead of specific codes. However, registries are free to offer common causes of death in their data collection form which are automatically mapped to their respective codes.

### Cause of death classification

Classification used in the item `Cause of death code`.

**Item type:** single selection

**Consistency rules:** *Must* be provided if `Cause of death code` is provided.

**Related items in previous version:** 3.02

**Changes:** This item was added in version 2.0 to allow for future use of other classifications than ICD-10.

| Value ID | Description |
|---|---|
| ICD-10 | ICD-10 |
| ICD-11 | ICD-11 |

## Genetic diagnosis

The registry *should* ask the individual to upload (if the registrys platform supports this) or send a copy of their genetic report to confirm their diagnosis and enter the data collected in the following items. Furthermore, the name and location of the genetic testing centre *should* be collected locally, as this will allow curators to request a copy of the genetic report if it is not immediately available or to request further clarification or information if needed (permission to do this *should* be sought within the consent process where applicable).

### Genetic confirmation

CR PR

Specifies whether the diagnosis has been genetically confirmed. If the genetic test results are pending, the value *must* be `No`.

This item refers to a diagnosis of 5q SMA. If the value is `Yes`, the results *must* be captured in one or more instances of the record `Genetic report`.

**Item type:** yes/no

**Consistency rules:** *Must* be `Yes` in case an instance of the record `Genetic report` is provided.

**Related items in previous version:** 4.00

**Changes:** In version 2.0, it was clarified that this item applies to 5q SMA.

### Screening

Specifies whether the diagnosis was made as a result of screening.

This item refers to a diagnosis of 5q SMA.

**Item type:** single selection

**Related items in previous version:** 4.01

**Changes:** In version 2.1, it was clarified that this item refers to a diagnosis of 5q SMA.

| Value ID | Description |
|---|---|
| Family screening | The diagnosis was made as a result of family screening |
| Newborn screening | The diagnosis was made as a result of a newborn screening programme |
| Prenatal screening | The diagnosis was made as a result of prenatal screening |
| No screening | The diagnosis was not made as a result of screening |

## Genetic report

CR PR

The datestamp of this record *must* be the date of the genetic report. All information collected in this record *should* be extracted from the genetic report and confirmed with a geneticist if necessary.

**Related items in previous version:** 4.04

**Changes:** Since version 2.1, this record is no longer longitudinal and the item `Genetic report date` was added instead.

### Genetic report date

CR PR

**Item type:** date

### SMN1 variant

CR PR

**Item type:** single selection

**Related items in previous version:** 4.05

**Changes:** In version 2.0, the following changes were applied:

- The terminology recommended in HGVS is used (for example, substitution instead of point mutation).
- The reference to exon 8 was removed.
- The value `Homozygous substitution` was added.

| Value ID | Description |
|---|---|
| Homozygous deletion exon 7 | Homozygous deletion of exon 7 of SMN1 |
| Compound heterozygous deletion exon 7 | Compound heterozygous deletion of exon 7 of SMN1 and a substitution (point mutation) in SMN1 |

| Value ID | Description |
|---|---|
| Compound heterozygous substitutions | Compound heterozygous for two substitutions (point mutations) in SMN1 |
| Homozygous substitution | Homozygous for a single substitution (point mutation) in SMN1 (rare, may occur in consanguinous families) |

#### SMN1 variant HGVS

CR PR

Description of the variant according to HGVS nomenclature[12].

The variant described here *must* be located in the SMN1 gene. The value *must* be collected only if the variant includes a substitution (point mutation), i.e. `SMN1 variant` is either `Compound heterozygous deletion exon 7`, `Compound heterozygous substitutions` or `Homozygous substitution`. Otherwise it *should* be collected. If the reference sequence is known, it *must* be included.

Examples:

- `NM_000344.3:c.[824_834del];[815A>G]` for a compound heterozygous deletion of exon 7 and a substitution
- `NM_000344.3:c.[c.815A>C];[c.821C>T]` for compound heterozygous substitutions

**Item type:** restricted text

**Changes:** This item was added in version 2.0 to allow providing details in case of a substitution.

#### SMN1 testing method

Testing method used to obtain the genetic result.

Registries *may* add an additional free-text field in their data collections forms to capture possible methods other than the ones provided in this item; values in the free-text field *should* be checked by a curator and mapped to the provided values wherever possible. New methods may be added to the dataset by TREAT-NMD whenever appropriate.

This item refers to the testing method used to obtain the result provided in `SMN1 variant` and `SMN1 variant HGVS`.

**Item type:** single selection

**Related items in previous version:** 4.06

**Changes:** In version 2.0, the option for other methods and the associated implicit free-text field were removed. However, registries *may* include them in their data collection forms as noted above.

| Value ID | Description |
|---|---|
| RFLP | RFLP (Restriction Fragment Length Polymorphism) |
| HRM | HRM (High Resolution Melting) |
| MLPA | MLPA (Multiplex Ligation-dependent Probe Amplification) |
| DNA sequencing | DNA Sequencing |

[12] <https://varnomen.hgvs.org/>

| Value ID | Description |
|---|---|
| qrtPCR | qrtPCR (Quantitative Real-Time PCR) |
| ddPCR | ddPCR (Droplet Digital PCR) |

#### SMN2 copy number

CR PR

SMN2 copy number following the following format:

- If the precise number is known, it is given as an integer, for example "3"
- If only a range is known, the lower and upper inclusive bounds are given and separated by a hyphen-minus. For example, if the copy number is known to be at least 3 and at most 5, it is specified as "3-5".
- If only a lower bound is known, it is specified with an appended plus sign. For example, if the copy number is known to be at least 4, it is specified as "4+".

**Item type:** restricted text

**Related items in previous version:** 4.09

**Changes:** In version 2.0, the type was changed to restricted text with the specified format in order to allow providing ranges when the precise number is unknown.

#### SMN2 copy number testing method

Testing method used to obtain the genetic result.

Registries *may* add an additional free-text field in their data collections forms to capture possible methods other than the ones provided in this item; values in the free-text field *should* be checked by a curator and mapped to the provided values wherever possible. New methods may be added to the dataset by TREAT-NMD whenever appropriate.

This item refers to the testing method used to obtain the result provided in `SMN2 copy number`.

**Item type:** single selection

**Related items in previous version:** 4.08

**Changes:** In version 2.0, the option for other methods and the associated implicit free-text field were removed. However, registries *may* include them in their data collection forms as noted above.

| Value ID | Description |
|---|---|
| RFLP | RFLP (Restriction Fragment Length Polymorphism) |
| HRM | HRM (High Resolution Melting) |
| MLPA | MLPA (Multiplex Ligation-dependent Probe Amplification) |
| DNA sequencing | DNA Sequencing |
| qrtPCR | qrtPCR (Quantitative Real-Time PCR) |
| ddPCR | ddPCR (Droplet Digital PCR) |

#### SMN2 variant c859GtoC

Specifies whether the variant c.859G>C is present in the SMN2 gene. `Yes` means that the variant was found, `No` means that the variant was checked for but not found.

The ID of this item does not contain the period and the character '>' because they are not valid characters for identifiers in many software environments. Data collection forms *should* display the HGVS-compliant variant description c.859G>C in questions or labels.

**Item type:** yes/no

**Changes:** This item was added in version 2.0.

#### SMN2 variant c859GtoC testing method

Testing method used to obtain the genetic result.

Registries *may* add an additional free-text field in their data collections forms to capture possible methods other than the ones provided in this item; values in the free-text field *should* be checked by a curator and mapped to the provided values wherever possible. New methods may be added to the dataset by TREAT-NMD whenever appropriate.

This item refers to the testing method used to obtain the result provided in `SMN2 variant c859GtoC`.

**Item type:** single selection

**Changes:** This item was added in version 2.0.

| Value ID | Description |
|---|---|
| RFLP | RFLP (Restriction Fragment Length Polymorphism) |
| HRM | HRM (High Resolution Melting) |
| MLPA | MLPA (Multiplex Ligation-dependent Probe Amplification) |
| DNA sequencing | DNA Sequencing |
| qrtPCR | qrtPCR (Quantitative Real-Time PCR) |
| ddPCR | ddPCR (Droplet Digital PCR) |

## Clinical observations

Please also see the online examples.

### Symptom onset

CR PR datestamped

Period in which the first symptoms manifested, as reported by the individual or their family. Any symptoms which were not considered abnormal at the time, but can retrospectively be attributed to the disease, *should* be considered as well. If the value is `Asymptomatic`, this item *must* be collected at each update until the individual shows first symptoms. If the value is not `Asymptomatic`, the datestamp is irrelevant and therefore not *required*.

This item refers to symptoms of SMA. If the value is `Postnatal`, the date *must* be specified in `Symptom onset date`, if known.

**Item type:** single selection

**Consistency rules:** If values for both this item and `Symptom onset date` are provided, they *must* be consistent.

**Related items in previous version:** 5.00

**Changes:** In version 2.0, the following changes were made:

- It was specified that `At birth` includes up to two weeks of age.
- The value `Asymptomatic` was added.
- The wording At what age was it suspected that something might be different? was removed in order to clarify that this item refers to the manifestation of symptoms, even in cases where the diagnosis is known beforehand (for example through screening).

In version 2.1, it was clarified that this item refers to symptoms reported by the individual or their family and that any symptoms which were not considered abnormal at the time, but can retrospectively be attributed to the disease, should be considered as well.

| Value ID | Description |
|---|---|
| Prenatal | Prenatal |
| At birth | At birth or up to two weeks of age |
| Postnatal | Postnatal (two weeks of age or older) |
| Asymptomatic | Asymptomatic |

## Symptom onset date

CR PR

Date of the onset of the first symptoms as defined in the item `Symptom onset`. Registries *may* ask for the onset age in their data collection form and calculate the date from the date of birth.

This value *must* be collected only if `Symptom onset` is `Postnatal`.

**Item type:** date

**Related items in previous version:** 5.00

## SMA type

CR PR

Spinal Muscular Atrophy type as clinical diagnosis given by clinician in charge of the individuals care. In patient-reported registries this item *should* be verified by the Curator.

| SMA type | Usual age of symptoms onset |
|---|---|
| Type 0 | Before birth |
| Type 1 | Between birth and 6 months |
| Type 2 | 7 months  18 months |
| Type 3a | 18 months  36 months |
| Type 3b | 3 years  18 years |
| Type 4 | Over 18 years |

Type 1-4 definitions taken from the SMA Family Guide[13].

**Item type:** single selection

**Related items in previous version:** 5.01

**Changes:** In version 2.0, the values `3a`, `3b` and `Undetermined` were added.

| Value ID | Description |
|---|---|
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |
| 3a | 3a |
| 3b | 3b |
| 3 | 3 (subtype not known or not determined) |
| 4 | 4 |
| Undetermined | 5q SMA of undetermined type |

## Clinician Global Impression of Severity

CR longitudinal

CGI-S (Clinician Global Impression of Severity): *Clinicians rating of this individual's current severity of illness; based on the clinicians total clinical experience with people with SMA.*

This item *should* be captured once per individual; after that, the `Clinician Global Impression of Improvement` (CGI-I) *should* be captured at each update. Even though there will, therefore, usually be only one value of this item for each individual, it is marked as longitudinal instead of datestamped to account for registries who choose to collect the value more than once for an individual.

**Item type:** single selection

**Related items in previous version:** 15.00, 15.01

**Changes:** In version 2.0, the wording of the value descriptions was adapted.

[13] <https://treat-nmd.org/care-overview/2017-standards-of-care-for-spinal-muscular-atrophy-sma/the-guide-to-the-2017-international-standards-of-care-for-sma/>

| Value ID | Description |
|---|---|
| 1 | Not at all affected |
| 2 | Borderline affected |
| 3 | Mildly affected |
| 4 | Moderately affected |
| 5 | Markedly affected |
| 6 | Severely affected |
| 7 | Among the most extremely affected individuals |

## Clinician Global Impression of Improvement

longitudinal

Clinician Global Impression of Improvement (CGI-I) according to clinician: *How does the clinician feel that the individuals condition has changed in the last 6 months?*

This item *should* only be captured from clinicians at follow-up (the item `Clinician Global Impression of Severity` is used at baseline). It enables a comparison between the individuals impression of their disease progression (item `Patient Global Impression of Improvement`) and the impression of their clinician.

**Item type:** single selection

**Related items in previous version:** 15.04, 15.05

| Value ID | Description |
|---|---|
| 1 | Very much improved |
| 2 | Much improved |
| 3 | Minimally improved |
| 4 | No change |
| 5 | Minimally worse |
| 6 | Much worse |
| 7 | Very much worse |

## Height

longitudinal

### Height

Height or length of the individual, as directly measured or calculated using the method specified in `Height measurement method`.

**Item type:** decimal

**Unit:** centimetres

**Related items in previous version:** 5.02

**Height measurement method**

Method used to obtain the value of `Height`.

Please note: Standing and Recumbent methods will not give accurate results where contractures and/or significant scoliosis exist. Arm span method will not give accurate results where arm contractures exist. In these cases, the Ulnar length method should be used.

- **Standing height**: Person length (height) is measured using a vertical length scale. The person would stand with footwear removed over a fixed platform or the floor and an unfixed headboard would be adjusted to the top of the head. Record the measurement to the nearest cm mark.
- **Recumbent length**: Employment of a horizontal length scale (or bench with steel ruler or tape). The person is placed flat on the horizontal measuring board, with footwear removed. The head should be placed against the fixed headboard, and the footboard adjusted so that it is against the base of the feet. Record the measurement to the nearest 1/2 inch / 1 cm.
- **Arm span**: Measure using a flexible tape, from the tip of the middle finger of one hand to the tip of the middle finger of the other hand. The person stands with their back to the wall, with both arms abducted to 90ř, the elbows and wrists extended and the palms facing directly forward.
- **Ulnar length**: Measure between the point of the elbow (olecranon process) and the midpoint of the prominent bone of the wrist (styloid process) (left side if possible). If using this method, the body height calculated from the measurement is to be provided.

**Item type:** single selection

**Related items in previous version:** 5.03

| Value ID | Description |
|---|---|
| Standing height | Standing height |
| Recumbent length | Recumbent length |
| Arm span | Arm span |
| Ulnar length | Ulnar length |

## Weight

longitudinal

Weight of the individual.

**Item type:** decimal

**Unit:** kilograms

**Related items in previous version:** 5.04

## Head circumference

longitudinal

This item is only relevant for infants up the age of 24 months. This measurement should be taken with a device that cannot be stretched. Wrap the tape snugly around the widest possible circumference - from the most prominent part of the forehead (often 1-2 fingers above the eyebrow) around to the widest part of the back of the head. Try to find the widest way around the head.

**Item type:** decimal

**Unit:** centimetres

**Related items in previous version:** 5.05

### Shoulder contractures

longitudinal

Specifies whether the individual has shoulder contractures.

**Item type:** yes/no

**Related items in previous version:** 5.08

### Elbow contractures

longitudinal

Specifies whether the individual has elbow contractures.

**Item type:** yes/no

**Related items in previous version:** 5.09

### Wrist contractures

longitudinal

Specifies whether the individual has wrist contractures.

**Item type:** yes/no

**Related items in previous version:** 5.10

### Finger contractures

longitudinal

Specifies whether the individual has finger contractures.

**Item type:** yes/no

**Related items in previous version:** 5.11

### Hip contractures

longitudinal

Specifies whether the individual has hip contractures.

**Item type:** yes/no

**Related items in previous version:** 5.12

### Knee contractures

longitudinal

Specifies whether the individual has knee contractures.

**Item type:** yes/no

**Related items in previous version:** 5.13

### Ankle contractures

longitudinal

Specifies whether the individual has ankle contractures.

**Item type:** yes/no

**Related items in previous version:** 5.14

### Jaw contractures

longitudinal

Specifies whether the individual has jaw contractures.

**Item type:** yes/no

**Changes:** This item was added in version 2.0.

## Scoliosis

Please also see the online examples.

### Scoliosis diagnosis

CR PR datestamped

Specifies whether the individual has ever been diagnosed with scoliosis.

**Item type:** yes/no

**Related items in previous version:** 6.00

**Changes:** In version 2.1, it was clarified that this item specifies whether the patient has *ever* been diagnosed with scoliosis and the item was changed from longitudinal to datestamped.

### Cobb angle

**Changes:** Since version 2.1, the item `Cobb angle` is no longer longitudinal and this record as well as the item `Cobb angle date` were added instead.

#### Cobb angle date

Date when the value specified in the item `Cobb angle` was measured. This *may* be date of the radiology examination or the date of the radiology report.

**Item type:** date

#### Cobb angle

Cobb angle according to radiology results.

**Item type:** decimal

**Unit:** degrees

**Related items in previous version:** 6.01

### Scoliosis surgery performed

CR PR datestamped

Specifies whether the individual has ever had surgery specifically to try and correct scoliosis.

**Item type:** yes/no

**Related items in previous version:** 6.02

**Changes:** In version 2.1, this item was changed from longitudinal to datestamped.

### Scoliosis surgery

Registries are free to collect additional data such as the surgery technique. Surgery for invasive lengthening of growing rods *must not* be included in this record.

**Changes:** Since version 2.1, this record is no longer longitudinal and the item `Scoliosis surgery date` was added instead.

#### Scoliosis surgery date

Date of the scoliosis surgery.

**Item type:** date

**Related items in previous version:** 6.04

## Motor function

Every registry *must* collect the motor function status with respect to each of the following abilities. These items are intended to be feasible for all registries (both clinician and patient-reported) to collect.

- **Hold head up without support**: Able to support weight of own head without assistance or resting head against an object.
- **Roll onto side**: From a supine position, able to roll onto (either left or right) side without assistance.
- **Sit without support** (WHO): Sits up straight with the head erect for at least 10 seconds. Does not use arms or hands to balance body or support position.

- **Crawl on hands and knees** (WHO): Alternately moves forward or backward on hands and knees. The stomach does not touch the supporting surface. There are continuous and consecutive movements, at least three in a row.
- **Stand with assistance** (WHO): Stands in upright position on both feet, holding onto a stable object (e.g. furniture) with both hands without leaning on it. The body does not touch the stable object, and the legs support most of the body weight. Thus stands with assistance for at least 10 seconds.
- **Stand without assistance** (WHO): Stands in upright position on both feet (not on the toes) with the back straight. The legs support 100
- **Walk with assistance** (WHO): Upright position with the back straight. Makes sideways or forward steps by holding onto a stable object (e.g. furniture) with one or both hands. One leg moves forward while the other supports part of the body weight. Takes at least 5 steps in this manner.
- **Walk without assistance** (WHO): Takes at least 5 steps independently in upright position with the back straight. One leg moves forward while the other supports most of the body weight. There is no contact with a person or object.
- **Walk 10 metres without assistance**: As Walk without assistance, but walks in this manner for at least 10 meters.
- **Climb stairs**: Climbs at least 4 stairs independently. Contact with a railing is permitted but there is no additional help from a person or other object.
- **Useful function of hands** (RULM): Can use hands to hold pencil or pick up a token or drive a powered chair, use phone key pad. Corresponds to a score of 1 of the RULM entry item.
- **Reach overhead in a sitting position** (RULM): Can raise both arms simultaneously above head whilst in a sitting position. Corresponds to a score of 5 or 6 on the RULM entry item.
- **Raise hands to mouth in a sitting position** (RULM): Can raise one or two hands to mouth whilst in a sitting position. Corresponds to a score of 2 on the RULM entry item.

Abilities marked with WHO are taken from the WHO Motor Milestones[14]; those marked with RULM are contained in the Revised Upper Limb Module[15].

For each ability, the present and past status of the individual *must* be collected. Since the type of information to be collected is the same for each ability, this group contains only two records. For every individual, at least one instance of each record *must* be provided for each of the abilities.

Please also see the online examples.

## Motor ability

CR PR longitudinal

The datestamp of this record *must* be the date to which the value of `Motor ability status` refers. This *may* generally be assumed to be the entry date for patient-reported registries, or the date of the clinical examination for clinician-reported registries.

**Related items in previous version:** 7.00, 7.01, 7.02, 7.03, 7.04, 7.05, 7.06, 7.07, 7.08, 7.09, 7.10, 7.11, 7.12

### Motor ability

CR PR

[14] <https://www.who.int/childgrowth/mgrs/en/fnb_motor_37_45.pdf?ua=1>
[15] <http://columbiasma.org/docs/cme-2010/RULM-Generic-Manual-16-Dec-2014.pdf>

**Item type:** single selection

| Value ID | Description |
|---|---|
| Hold head without support | Hold head up without support |
| Roll onto side | Roll onto side |
| Sit without support | Sit without support |
| Crawl | Crawl on hands and knees |
| Stand with assistance | Stand with assistance |
| Stand without assistance | Stand without assistance |
| Walk with assistance | Walk with assistance |
| Walk without assistance | Walk without assistance |
| Walk 10 metres without assistance | Walk 10 metres without assistance |
| Climb stairs | Climb stairs |
| Useful function of hands | Useful function of hands |
| Reach overhead in a sitting position | Reach overhead in a sitting position |
| Raise hands to mouth in a sitting position | Raise hands to mouth in a sitting position |

### Motor ability status

CR PR

Specifies whether the individual currently has or previously had the ability specified in `Motor ability`.

If the value is `Currently`, `Previously`, or `Sometime`, one or more instances of the record `Motor ability episode` *should* be provided to specify details.

**Item type:** single selection

**Changes:** In version 2.0, this item replaced the items specified in version 1 as For each motor function item, specify: Never able; Gained [...]; Gained and lost [...]. As the new item is in a longitudinal record, it is thus possible to provide multiple snapshot assessments, in particular when they are made by a clinician who can only judge the current status at each visit.

| Value ID | Description |
|---|---|
| Currently | This is currently the case |
| Previously | This has previously been the case, but is not currently |
| Never | This has never been the case, neither previously nor currently |
| Sometime | This has been the case at some time, but it is unknown whether it is currently the case |
| Not currently | This is currently not the case, but it is unknown whether it has previously been the case |

#### Motor ability observed in clinic

CR PR

Specifies whether the assessment given in `Motor ability status` was made by a healthcare professional. For patient-reported registries, this item *may* implicitly be assumed to always have the value `No`.

**Item type:** yes/no

### Motor ability episode

CR PR episode

It is assumed that the episodes will always be provided by the individual or caregiver, either directly (in patient-reported or dual-reported registries) or reported to a clinician (in clinician-reported registries). To collect observations made by a clinician, use the record `Motor ability` with a value of `Yes` for the item `Motor ability observed in clinic`.

The start and stop dates of this episode *may* also be collected by asking for the age (for instance with separate fields for years and months). The ages *must* be converted into (partial) dates when the values of `Start date` and `Stop date` are required.

**Related items in previous version:** 7.00, 7.01, 7.02, 7.03, 7.04, 7.05, 7.06, 7.07, 7.08, 7.09, 7.10, 7.11, 7.12

**Changes:** In version 2.0, this record replaced the items specified in version 1 as age YY-MM in case the ability was gained and age gained YY-MM and age lost YY-MM in case the ability was gained and lost. By providing more that once record instance, the episode structure also allows providing details in case an ability was regained.

#### Motor ability episode

CR PR

Motor ability this episode refers to.

**Item type:** single selection

| Value ID | Description |
|---|---|
| Hold head without support | Hold head up without support |
| Roll onto side | Roll onto side |
| Sit without support | Sit without support |
| Crawl | Crawl on hands and knees |
| Stand with assistance | Stand with assistance |
| Transfer | Transfer from bed to chair |
| Stand without assistance | Stand without assistance |
| Get up from chair | Get up from chair |
| Rise from floor | Rise from floor without assistance |
| Walk with assistance | Walk with assistance |
| Walk without assistance | Walk without assistance |

| Value ID | Description |
|---|---|
| Walk 10 metres without assistance | Walk 10 metres without assistance |
| Climb stairs | Climb stairs |
| Run | Run |
| Useful function of hands | Useful function of hands |
| Reach overhead in a sitting position | Reach overhead in a sitting position |
| Raise hands to mouth in a sitting position | Raise hands to mouth in a sitting position |

## Wheelchair usage

The items in this group *must* be collected for individuals who are aged 24 months or older. As this item is concerned solely with the individuals ambulation status, the type of device is not relevant. Therefore, all items refer to manual or powered wheelchairs or similar assisted mobility devices. These include devices such as a mobility scooter or a stroller, but exclude devices that assist the user in walking (e.g. a walker or cane) or do not support mobility (e.g. a static standing frame).

Please also see the online examples.

### Wheelchair usage

CR PR longitudinal

Specifies whether the individual is currently using or has previously used a manual or powered wheelchair or similar assisted mobility device due to their neuromuscular condition.

**Item type:** single selection

**Related items in previous version:** 8.00

**Changes:** In version 2.0, the item was split into one item for a snapshot and an episode record for encoding the start and stop dates. Furthermore, it was clarified that assisted mobility devices similar to wheelchairs are to be included as well.

In version 2.1, it was clarified that this item and and the following record `Wheelchair usage episode` apply only to use of a wheelchair due to the individual's neuromuscular condition.

| Value ID | Description |
|---|---|
| Currently | This is currently the case |
| Previously | This has previously been the case, but is not currently |
| Never | This has never been the case, neither previously nor currently |
| Sometime | This has been the case at some time, but it is unknown whether it is currently the case |
| Not currently | This is currently not the case, but it is unknown whether it has previously been the case |

### Wheelchair usage episode

CR PR episode

Episode that describes when the individual used or has been using a manual or powered wheelchair or similar assisted mobility device due to their neuromuscular condition, with the frequency specified in `Wheelchair usage frequency`.

**Related items in previous version:** 8.00

#### Wheelchair usage frequency

CR PR

Specifies the frequency of wheelchair usage.

**Item type:** single selection

**Changes:** Before version 2.1, this item was erroneously marked as longitudinal.

| Value ID | Description |
|---|---|
| Part-time | Part-time (the individual is sometimes able to get around without a wheelchair or similar device) |
| Full-time | Full-time (the individual is unable to get around at all without a wheelchair or similar device) |

## Nutrition

A gastric tube (G-tube or gastrostomy) is a surgical opening into the stomach, in this case to insert a flexible feeding tube through the abdominal wall and into the stomach to allow direct delivery of adequate nutrition. A gastric tube is sometimes referred to as a PEG (percutaneuos endoscopic gastrostomy). A nasal feeding tube (also called nasogastric tube) is one that goes through the nose and down into the stomach.

Please also see the online examples.

### Feeding tube usage

CR PR longitudinal

Specifies whether the individual is currently using or has ever used a feeding tube for feeding due to their neuromuscular condition. If the value is `Currently`, `Previously`, or `Sometime`, one or more instances of the record `Feeding tube usage episode` *should* be provided to specify details.

**Item type:** single selection

**Related items in previous version:** 9.00

**Changes:** In version 2.0, the item was split into one item for a snapshot and an episode record for encoding the start and stop dates.

In version 2.1, it was clarified that this item and the following record `Feeding tube usage episode` apply only to feeding tube usage for feeding and due to the individual's neuromuscular condition.

| Value ID | Description |
|---|---|
| Currently | This is currently the case |
| Previously | This has previously been the case, but is not currently |
| Never | This has never been the case, neither previously nor currently |
| Sometime | This has been the case at some time, but it is unknown whether it is currently the case |
| Not currently | This is currently not the case, but it is unknown whether it has previously been the case |

### Feeding tube usage episode

CR PR episode

Episode that describes current or previous usage of a feeding tube for feeding due to the individual's neuromuscular condition. The start, stop and ongoing dates of this record apply to the feeding tube usage of the type specified in `Feeding tube usage type`. If the individual switched from one type of usage to another, two record instances *must* be provided.

**Related items in previous version:** 9.00

#### Feeding tube usage type

CR PR

**Item type:** single selection

| Value ID | Description |
|---|---|
| Exclusive | The individual is or was exclusively fed by a tube |
| Supplementary | The individual is or was supplementarily fed by a tube, e.g. for fluids |

## Pulmonary function

Please also see the online examples.

### Invasive ventilation usage

CR PR longitudinal

Specifies whether the individual is currently using or has ever used invasive ventilation due to their neuromuscular condition over a period of two weeks or more. If the value is `Currently`, `Previously`, or `Sometime`, one or more instances of the record `Invasive ventilation episode` should be provided to specify details.

Invasive ventilation (IV) is surgery that creates an opening in the windpipe which allows breathing through a tracheostomy tube rather than through the nose and mouth.

**Item type:** single selection

**Related items in previous version:** 10.00

**Changes:** In version 2.0, the structure of the item was changed.

In version 2.1, it was clarified that this item and the following record `Invasive ventilation episode` apply only to ventilation use due to the individual's neuromuscular condition.

| Value ID | Description |
|---|---|
| Currently | This is currently the case |
| Previously | This has previously been the case, but is not currently |
| Never | This has never been the case, neither previously nor currently |
| Sometime | This has been the case at some time, but it is unknown whether it is currently the case |
| Not currently | This is currently not the case, but it is unknown whether it has previously been the case |

## Invasive ventilation episode

CR PR episode

Episode that describes current or previous usage of invasive ventilation due to the individual's neuromuscular condition. Only periods of two weeks or more are to be added.

**Related items in previous version:** 10.00, 10.02

### Invasive ventilation duration

CR PR

**Item type:** single selection

**Related items in previous version:** 10.01

| Value ID | Description |
|---|---|
| Full-time | Full-time (the individual uses ventilation of the respective type for 16 hours or more per 24 hours) |
| Part-time awake and sleeping | Part-time, awake and sleeping (the individual uses ventilation of the respective type while awake and while sleeping, or only while awake, with a total duration of less than 16 hours per 24 hours) |
| Part-time sleeping | Part-time, only while sleeping (the individual uses ventilation of the respective type only while sleeping) |
| Part-time | Part-time (the individual uses ventilation of the respective type with a total duration of less than 16 hours per 24 hours, but it is unspecified whether only while sleeping or also while awake) **Deprecated since version 2.0:** Either `Part-time awake and sleeping` or `Part-time sleeping` *should* be specified instead. |

## Non-invasive ventilation usage

CR PR longitudinal

Specifies whether the individual is currently using or has ever used non-invasive ventilation due to their neuromuscular condition over a period of two weeks or more. If the value is `Currently`, `Previously`, or `Sometime`, one or more instances of the record `Non-invasive ventilation episode` should be provided to specify details.

Non-invasive ventilation (NIV) uses airway support which is administered through a nose or face mask.

**Item type:** single selection

**Related items in previous version:** 10.03

**Changes:** In version 2.1, it was clarified that this item and the following record `Non-invasive ventilation episode` apply only to ventilation use due to the individual's neuromuscular condition.

| Value ID | Description |
|---|---|
| Currently | This is currently the case |
| Previously | This has previously been the case, but is not currently |
| Never | This has never been the case, neither previously nor currently |
| Sometime | This has been the case at some time, but it is unknown whether it is currently the case |
| Not currently | This is currently not the case, but it is unknown whether it has previously been the case |

## Non-invasive ventilation episode

CR PR episode

Episode that describes current or previous usage of non-invasive ventilation due to the individual's neuromuscular condition. Only periods of two weeks or more are to be added.

**Related items in previous version:** 10.03, 10.05

### Non-invasive ventilation duration

CR PR

**Item type:** single selection

**Related items in previous version:** 10.04

| Value ID | Description |
|---|---|
| Full-time | Full-time (the individual uses ventilation of the respective type for 16 hours or more per 24 hours) |
| Part-time awake and sleeping | Part-time, awake and sleeping (the individual uses ventilation of the respective type while awake and while sleeping, or only while awake, with a total duration of less than 16 hours per 24 hours) |

| Value ID | Description |
|---|---|
| Part-time sleeping | Part-time, only while sleeping (the individual uses ventilation of the respective type only while sleeping) |
| Part-time | Part-time (the individual uses ventilation of the respective type with a total duration of less than 16 hours per 24 hours, but it is unspecified whether only while sleeping or also while awake) **Deprecated since version 2.0:** Either `Part-time awake and sleeping` or `Part-time sleeping` *should* be specified instead. |

### Airway clearance assistance

longitudinal

Specifies how often the individual currently uses assistance in airway clearance and/or secretion mobilisation, for example using suction, chest percussion or a cough assist device.

**Item type:** single selection

**Related items in previous version:** 10.06, 10.07, 10.08, 10.09, 10.10, 10.11

**Changes:** In version 2.0, the type of assistance was removed from the dataset.

| Value ID | Description |
|---|---|
| Daily | Daily (used once or more in each 24-hour period) |
| Weekly | Weekly (used less frequently than daily, but used once or more in each 7-day period) |
| Occasionally | Occasionally (used less frequently than weekly) |
| Never | Never |

### Pulmonary function test performed

CR PR datestamped

Specifies whether the individual has ever had a pulmonary function test. If one or more tests have been performed, the results are to be provided in instances of the record `Pulmonary function test result`.

**Item type:** yes/no

**Related items in previous version:** 10.12

**Changes:** In version 2.0, this item was changed to apply to any pulmonary function test and not only to a forced vital capacity test because of the addition of the item `Peak cough flow`.

### Pulmonary function test result

CR PR

At baseline, the result of the most recent test *must* be collected; at updates, the result of every test since the previous update *must* be collected. For clinician-reported registries, the date of the test or date of the report

as well as the values for FVC and PCF *must* be collected, whereas for patient-reported registries it is sufficient to collect the date of the test or report.

**Changes:** Since version 2.1, this record is no longer longitudinal and the item `Pulmonary function test date` was added instead.

#### Pulmonary function test date

CR PR

Date of the pulmonary function test in which the results specified in this record instance were obtained.

If that date is not known, the date of the report *may* be specified instead.

**Item type:** date

**Related items in previous version:** 10.13

#### Forced vital capacity volume

CR

Forced vital capacity as absolute volume in litres.

Forced vital capacity (FVC) is the total amount of air exhaled during the FEV (Forced expiratory volume) test.

**Item type:** decimal

**Unit:** litres

**Related items in previous version:** 10.14

#### Forced vital capacity percentage

CR

Forced vital capacity as percentage of predicted value.

**Item type:** decimal

**Unit:** percent

**Related items in previous version:** 10.15

#### Peak cough flow

CR

Peak cough flow (PCF) in litres per minute.

**Item type:** decimal

**Unit:** litres per minute

**Changes:** This item was added in version 2.0.

# Disease-modifying therapies (DMT)

Please also see the online examples.

## DMT received

CR PR datestamped

Specifies whether the individual has ever received a disease-modifying therapy for their neuromuscular condition.

For SMA, these currently include nusinersen (Spinraza), Zolgensma (AVXS-101) and risdiplam (Evrysdi).

**Item type:** yes/no

**Related items in previous version:** 11.00, 11.01

**Changes:** In version 2.1, this item was changed from longitudinal to datestamped.

## DMT episode

CR PR episode

The episode dates *must* be provided if and only if the therapy is administered over a period of time (currently nusinersen and risdiplam). For a therapy with a single administration (currently Zolgensma), the item `DMT single administration date` *must* be used. Registries *should* ensure that the individual's weight approximately at the beginning of the therapy is collected in the item `Weight`; in particular, if the therapy began before the baseline entry of the registration, the data collection form *should* include a field for the weight at therapy begin, which is then mapped to a value of `Weight` and datestamped with the therapy start date.

Note that the existence of an instance of this record implies that the individual is receiving or has received the therapy specified in `DMT`. It is not possible to express the fact that the individual has *not* received or is *not* receiving a certain therapy.

**Consistency rules:** A value for `DMT ongoing date` *must* be provided if and only if `DMT status` has the value `Ongoing`. If `DMT single administration date` is provided, all other dates in this record *must* be empty.

**Related items in previous version:** 11.00, 11.01, 11.03, 11.04

### DMT

CR PR

Specifies the disease-modifying therapy the individual is receiving or has received at some point.

**Item type:** single selection

**Related items in previous version:** 11.02

| Value ID | Description |
|---|---|
| Nusinersen | Spinraza (nusinersen) |
| Onasemnogene abeparvovec | Zolgensma (AVXS-101) |

| Value ID | Description |
|---|---|
| Risdiplam | Evrysdi (risdiplam) |

#### DMT status

CR PR

Specifies whether this therapy is ongoing or stopped.

This item does not apply to therapies with a single administration (currently Zolgensma).

**Item type:** single selection

**Consistency rules:** If a value for `Stop date` of this record is provided, this item *must* have the value `Stopped`.

**Background:** The disease-modifying therapies are collected in an episode record which already encodes whether the therapy is ongoing or has stopped by providing a value for `Ongoing date` or `Stop date`, respectively. However, in case the therapy is stopped, but the stop date is not known or has not been entered by the user and thus no value for `Stop date` can be provided, it is still important to encode this information. Therefore, unlike the other episode records in the dataset, the DMT record contains this item as a fallback.

**Related items in previous version:** 11.00, 11.01

| Value ID | Description |
|---|---|
| Ongoing | The individual has been receiving the therapy as of the date specified in 'Ongoing date' and has been continuously receiving it from the date specified in 'Start date' on (if specified) |
| Stopped | The individual has stopped continuously receiving the therapy since the date specified in 'Start date' |

#### DMT single administration date

CR PR

Date on which the individual received a single administration of the therapy specified in `DMT`.

**Item type:** date

**Changes:** This item was added in version 2.0.

#### DMT stopping reason

CR

Reason the individual has stopped receiving the therapy specified in `DMT` (in the case of a continuous treatment), or has received a different disease-modifying therapy after receiving a single-administration therapy specified in `DMT`.

In addition to the values listed for this item, registries *may* add further options in their data collection forms if relevant locally, and/or provide a free text field. However, additional options not specified in this dataset *must not* be provided in a data submission for a TREAT-NMD enquiry. Future revisions of this dataset may include additional values, and these can be suggested (along with justification) by using the Report an issue with this item function.

If `Side effects from procedure` or `Side effects from drug` is selected, a registry *may* remind the user to enter the side effects using the items in the group Hospitalisations and comorbidities. A registry *may* arrange their data collection form to collect side effects in any way that works best for them, for example in the same place as the disease-modifying therapies. However, the data structure *must* match the dataset items for hospitalisations and comorbidities to allow standardised data submission in case of enquiries.

**Item type:** single selection

**Related items in previous version:** 11.05

**Changes:** In version 2.0, the option `Lack of apparent benefit` was renamed to `Insufficient benefit` and the options `Scoliosis`, `Insufficient initial improvement` and `Loss of response` were added.

| Value ID | Description |
|---|---|
| Funding | Insurance coverage/funding |
| Side effects from procedure | Side effects from the procedure |
| Side effects from drug | Side effects from the drug |
| Scoliosis | Scoliosis |
| Insufficient benefit | Insufficient benefit |
| Insufficient initial improvement | Insufficient initial improvement |
| Loss of response | Loss of response |
| Elective choice | Elective choice |

### DMT dosage value

CR

Value of the dosage, given in the unit specified in `DMT dosage unit`.

**Item type:** decimal

**Related items in previous version:** 11.06

### DMT dosage unit

CR

Unit of the value specified in `DMT dosage value`.

**Item type:** single selection

**Related items in previous version:** 11.06

| Value ID | Description |
|---|---|
| Vector genomes per kilogram body weight | vector genomes per kilogram (vg/kg) of body weight |
| Milligrams per kilogram body weight | milligrams per kilogram (mg/kg) of body weight |
| Milligrams | milligrams |

#### DMT administration route

CR

Route of administration. If, for a specific therapy, only one value is possible, registries *may* omit this item from their forms and use a static value. The possible values will be amended in the future if additional therapies receive marketing authorisation.

**Item type:** single selection

**Related items in previous version:** 11.08

| Value ID | Description |
|---|---|
| Intrathecal | Intrathecal injection |
| Intravenous | Intravenous |
| Oral | Oral or via feeding tube |

#### DMT administration intervals

**This item currently only applies to nusinersen.** For any episodes where `DMT` is not `nusinersen`, this item is not intended for collection.

Comma-separated list of ISO 8601 durations that specify the intervals between the administrations. Repeating intervals *may* be specified as ISO 8601 recurring intervals by prepending `Rn/`, where `n` either is the number of repetitions, or absent in the case of unbounded repetitions.

For example, `P14D, P14D, P30D, R/P4M` specifies the (as of writing) current recommended dosing schedule for nusinersen: three loading doses administered at 14-day intervals, a fourth loading dose administered 30 days after the third dose, and maintenance doses once every 4 months thereafter.

**Item type:** restricted text

**Background:** Because the recommended intervals between the administrations of nusinersen vary between 14 days and 4 months, the criterion for a deviation from the schedule as defined in the item `DMT administration schedule deviation` (a deviation of 14 days or more for any interval) may not be useful in every case. Therefore, the actual intervals of nusinersen administration *may* be collected in this item.

**Related items in previous version:** 11.07

#### DMT administration schedule deviation

CR

**This item currently only applies to nusinersen and risdiplam.** For any episodes where `DMT` is not `nusinersen` or `risdiplam`, this item is not intended for collection and thus not mandatory. However, this item may be applied to future disease-modifying therapies in subsequent versions of this dataset.

**Deviation definition for nusinersen**: Specifies whether the interval between any two consecutive administrations of nusinersen differs by 14 days or more from that specified in the applicable prescription information.

**Deviation definition for risdiplam**: Specifies whether the individual has ever failed to take the prescribed dosage of risdiplam for 7 consecutive days or more during this episode.

**Item type:** yes/no

**Related items in previous version:** 11.09

### DMT administration schedule deviation reason

CR

**This item currently only applies to nusinersen and risdiplam.** For any episodes where `DMT` is not `nusinersen` or `risdiplam`, this item is not intended for collection and thus not mandatory. However, this item may be applied to future disease-modifying therapies in subsequent versions of this dataset.

Reason for not following the dosing schedule generally recommended at the time of administration. In case the value of `DMT administration schedule deviation` is `Yes`, this item *must* be collected. Otherwise, in particular when there was a schedule deviation which does not satisfy the condition specified in `DMT administration schedule deviation`, this item *may* also be collected.

In addition to the values listed for this item, registries *may* add further options in their data collection forms if relevant locally, and/or provide a free text field. However, additional options not specified in this dataset *must not* be provided in a data submission for a TREAT-NMD enquiry. Future revisions of this dataset may include additional values, and these can be suggested (along with justification) by using the Report an issue with this item function.

**Item type:** single selection

**Related items in previous version:** 11.10

**Changes:** The value `Other` and the related free-text field were removed from the dataset in version 2.0. However, registries *may* include them in their data collection forms as noted above.

| Value ID | Description |
|---|---|
| Illness | Illness |
| Access problem | Access problem (e.g. funding, institutional/organisational issues) |
| Scoliosis surgery | Scoliosis surgery |
| Non-compliance | Non-compliance |

### DMT corticosteroid administration duration

CR

**This item only applies to Zolgensma.** For any episodes where `DMT` is not `Onasemnogene abeparvovec`, this item is not intended for collection and thus not mandatory.

Duration in days of the administration of prophylactic systemic corticosteroids in relation to this Zolgensma administration, excluding the final tapering period in which the dose is gradually reduced at the end of the administration.

**Item type:** integer

**Unit:** days

**Changes:** This item was added in version 2.0.

#### DMT corticosteroid drug

CR

**This item only applies to Zolgensma.** For any episodes where `DMT` is not `Onasemnogene abeparvovec`, this item is not intended for collection and thus not mandatory.

Drug that was administered as prophylactic systemic corticosteroid in relation to this Zolgensma administration.

**Item type:** single selection

**Changes:** This item was added in version 2.0.

| Value ID | Description |
|---|---|
| prednisone oral | prednisone (oral) |
| prednisolone oral | prednisolone (oral) |

## Anti-AAV9 antibody test

For each anti-AAV9 antibody test, one record instance should be provided. This data *should* be collected for all patients, regardless of whether they have received Zolgensma or not.

**Changes:** These items were added in version 2.0.

> Since version 2.1, this record is no longer longitudinal and the item `Anti-AAV9 antibody test date` was added instead. Furthermore, it was clarified that this data *should* be collected for all patients, regardless of whether they have received Zolgensma or not.

#### Anti-AAV9 antibody test date

**Item type:** date

#### Anti-AAV9 antibody test result

Antibody titre measured in this anti-AAV9 antibody test. Registries *may* collect the precise titre, but *must* be prepared to map the data to the two values provided here.

**Item type:** single selection

| Value ID | Description |
|---|---|
| <= 1:50 | Antibody titre lower than or equal to 1:50 |
| > 1:50 | Antibody titre greater than 1:50 |

#### Anti-AAV9 antibody test days before administration

Days between this anti-AAV9 antibody test and the Zolgensma administration in relation to which it was performed. A positive value means that the test was performed before the Zolgensma administration, while a negative means that the test was performed afterwards. For example, a value of `1` denotes that the test was performed the day before the administration.

**Item type:** integer

**Unit:** days

# Medication and rehabilitation

Please also see the online examples.

## Allopathic drugs

CR PR reference period

### Allopathic drug usage

CR PR

Specifies whether the individual has taken any prescribed allopathic drugs (to manage symptoms - not disease-modifying) or supplements during this reference period. If the value is `Yes`, details for each drug *may* be specified in instances of the record `Allopathic drug episode`.

**Item type:** yes/no

**Related items in previous version:** 11.11

### Allopathic drugs

CR PR

Prescribed allopathic drugs or supplements the individual has taken during some time in the period from `Begin date` to `End date`.

Please note that the inclusion of a drug or supplement in this list does not indicate TREAT-NMD endorsement.

**Item type:** multiple selection

**Related items in previous version:** 11.12

| Value ID | Description |
|---|---|
| Vitamin D | Vitamin D |
| Calcium | Calcium |
| Bisphosphonates | Bisphosphonates |
| Biphosphonate | Biphosphonate **Deprecated since version 2.1:** The value ID `Bisphosphonates` *should* be used instead. |
| Gastroesophageal reflux | Drugs for gastroesophageal reflux |
| Constipation | Drugs for constipation |
| Antibiotics | Antibiotics |
| Anticholinergic drugs | Anticholinergic drugs |
| Influenza immunizations | Annual influenza immunizations |
| Pneumococcal immunizations | Annual pneumococcal immunizations |

| Value ID | Description |
|---|---|
| Creatine | Creatine |
| Acetyl-L-carnitine | Acetyl-L-carnitine |
| Phenylbutyrate | Phenylbutyrate |
| Gabapentin | Gabapentin |
| Thyrotropin-releasing hormone | Thyrotropin-releasing hormone |
| Hydroxyurea | Hydroxyurea |
| Valproate | Valproate |
| Albuterol | Albuterol |

#### Other allopathic drugs

CR PR

Comma-separated list of the International Nonproprietary Names (INNs)[16] of other drugs.

**Item type:** free text

**Related items in previous version:** 11.12

## Allopathic drug episode

episode

Details of the allopathic drugs the individual has taken. Although this record is not mandatory for any periods, it is intended to capture details on the drugs taken during the reference periods specified in the record `Allopathic drugs`. For any medications taken only once (or once a year, for example annual vaccinations), `Start date` and `Stop date` *should* both be equal to the administration date.

**Related items in previous version:** 11.13, 11.14

**Changes:** In version 2.1, it was clarified that for one-time medications, including annual vaccinations, `Start date` and `Stop date` *should* both be equal to the administration date.

#### Allopathic drug

Prescribed allopathic drug or supplement the individual has taken.

Please note that the inclusion of a drug or supplement in this list does not indicate TREAT-NMD endorsement.

**Item type:** single selection

**Related items in previous version:** 11.12

| Value ID | Description |
|---|---|
| Vitamin D | Vitamin D |
| Calcium | Calcium |
| Bisphosphonates | Bisphosphonates |

[16] <https://www.who.int/medicines/services/inn/en/>

| Value ID | Description |
|---|---|
| Biphosphonate | Biphosphonate **Deprecated since version 2.1:** The value ID `Bisphosphonates` *should* be used instead. |
| Gastroesophageal reflux | Drugs for gastroesophageal reflux |
| Constipation | Drugs for constipation |
| Antibiotics | Antibiotics |
| Anticholinergic drugs | Anticholinergic drugs |
| Influenza immunizations | Annual influenza immunizations |
| Pneumococcal immunizations | Annual pneumococcal immunizations |
| Creatine | Creatine |
| Acetyl-L-carnitine | Acetyl-L-carnitine |
| Phenylbutyrate | Phenylbutyrate |
| Gabapentin | Gabapentin |
| Thyrotropin-releasing hormone | Thyrotropin-releasing hormone |
| Hydroxyurea | Hydroxyurea |
| Valproate | Valproate |
| Albuterol | Albuterol |

#### Other allopathic drug

International Nonproprietary Name (INN)[17] of the other drug taken.

**Item type:** free text

**Related items in previous version:** 11.12

## Rehabilitative interventions

CR PR **reference period**

**Changes:** In version 2.0, these items were renamed from Therapeutic interventions to Rehabilitative interventions.

#### Rehabilitative interventions usage

CR PR

Specifies whether the individual has received any rehabilitative interventions in this period.

For the purposes of this dataset, rehabilitative interventions refers to the management of the individuals condition and quality of life through therapies from allied health professionals such as physiotherapists and speech therapists.

[17] <https://www.who.int/medicines/services/inn/en/>

**Item type:** yes/no

**Consistency rules:** If `Rehabilitative interventions` has a value, this item *must* have the value `Yes`.

**Related items in previous version:** 11.20

#### Rehabilitative interventions

CR PR

Rehabilitative interventions the individual has received at some time during the period from `Begin date` to `End date`.

In addition to the values listed for this item, registries *may* add further options in their data collection forms if relevant locally, and/or provide a free text field. However, additional options not specified in this dataset *must not* be provided in a data submission for a TREAT-NMD enquiry. Future revisions of this dataset may include additional values, and these can be suggested (along with justification) by using the Report an issue with this item function.

**Item type:** multiple selection

**Related items in previous version:** 11.20

**Changes:** The value `Other` and the related free-text field were removed from the dataset in version 2.0. However, registries *may* include them in their data collection forms as noted above.

| Value ID | Description |
|---|---|
| Physiotherapy | Physiotherapy sessions (e.g. stretches) |
| Respiratory physiotherapy | Respiratory physiotherapy sessions |
| Massage | Massage |
| Home programme | Home programme (e.g. stretches/exercises) |
| Hydrotherapy | Hydrotherapy/water-based activity |
| Contracture management using orthotics | Management of contractures using orthotics (e.g. ankle foot orthoses) |
| Spinal brace | Spinal brace |
| Occupational therapy | Occupational therapy sessions, or input/equipment for home |
| Speech therapy | Speech and language therapy sessions |

## Hospitalisations and comorbidities

Please also see the online examples.

### Hospitalisation period

CR PR reference period

#### Hospitalisation occurred

CR PR

Specifies whether the individual has been admitted to hospital as an inpatient (that is, with an overnight stay) for any reason (irrespective of circumstances or connection to their SMA) and for any duration, sometime during the period from `Begin date` to `End date`. Note that these dates do **not** specify the begin and end of a hospitalisation; they only define the period to which this item applies. An inpatient stay in a rehabilitation hospital is to be included in this item and in the record `Hospitalisation`. If the value of this item is `Yes`, the details of all hospitalisations *must* be collected in instances of the record `Hospitalisation`.

**Item type:** yes/no

**Related items in previous version:** 12.00

## Hospitalisation

CR PR

This record contains details for the hospitalisations that match the criteria specified in `Hospitalisation occurred` (inpatient treatments with an overnight stay).

At baseline, details for all hospitalisations in the past 12 months *should* collected. At subsequent updates, all hospitalisations since the last entry *should* be collected, while keeping any previously entered data.

The time period for this record *must* match the time period in the record `Hospitalisation period`. In case a different time period is used in the record `Hospitalisation period` (for example, if it is asked whether there have been any hospitalisations in the 24 months before the baseline entry, instead of only 12), all hospitalisations during that period *must* be collected.

**Changes:** Since version 2.1 this record is longer longitudinal and the item `Hospitalisation admission date` was added instead.

### Hospitalisation admission date

CR PR

Admission date of this hospitalisation.

**Item type:** date

**Related items in previous version:** 12.02

### Hospitalisation type

CR PR

Type of hospitalisation.

The quoted definition of acute care is taken from Hirshon 2013[18].

**Item type:** single selection

**Related items in previous version:** 12.01

[18] <https://doi.org/10.2471/blt.12.112664>

| Value ID | Description |
|---|---|
| Planned | Planned (admission was scheduled in advance, e.g. planned surgery, scan, or administration of treatment) |
| Acute | Acute (admission was in response to a sudden, often unexpected, urgent or emergent episode of injury and illness that can lead to death or disability without rapid intervention) |

#### Hospitalisation nights

CR PR

Number of nights the individual spent in hospital during this hospitalisation.

**Item type:** integer

**Consistency rules:** Value must be positive

**Related items in previous version:** 12.03

**Changes:** This item was specified as Number of days in hospital in version 1. Due to the ambiguity, it has been changed in version 2.0 to designate the number of nights spent in hospital. In a registry that had previously collected this information in way that is related to the number of nights in a predictable way (for example, if a form asks for the number of started days, this would consistently be the number of nights plus one), the data *should* be converted accordingly.

#### Hospitalisation acute reason code

CR

Main reason for this hospitalisation as a code in the classification specified in `Hospitalisation acute reason classification`. This item is intended mainly for acute hospitalisations and *must* be collected if `Hospitalisation type` is `Acute`. However, it *may* also be provided if `Hospitalisation type` is `Planned`, if an emergency occurred during the planned hospitalisation which would otherwise have required an acute hospitalisation.

Registries, in particular patient-reported ones, *may* provide users with a list of predefined reasons which are mapped to their respective codes.

**Item type:** restricted text

**Related items in previous version:** 12.04

#### Hospitalisation acute reason classification

CR

Classification used for the value of `Hospitalisation acute reason code`. If a registry collects codes using a fixed classification, it is not required to collect the classification explicitly from the user; in this case, a fixed value for this item *may* be used instead.

**Item type:** single selection

**Consistency rules:** *Must* be provided in case `Hospitalisation acute reason code` is provided.

**Related items in previous version:** 12.04

| Value ID | Description |
|---|---|
| ICD-10 | ICD-10 |
| ICD-11 | ICD-11 |
| MedDRA | MedDRA |

#### Hospitalisation planned reason

CR

Main reason for this hospitalisation. This item is only applicable to planned hospitalisations and *must* be collected only if `Hospitalisation type` is `Planned`.

In addition to the values listed for this item, registries *may* add further options in their data collection forms if relevant locally, and/or provide a free text field. However, additional options not specified in this dataset *must not* be provided in a data submission for a TREAT-NMD enquiry. Future revisions of this dataset may include additional values, and these can be suggested (along with justification) by using the Report an issue with this item function.

**Item type:** single selection

**Related items in previous version:** 12.05

**Changes:** The values `Other orthopaedic surgery` and `Other reason` and the related free-text fields were removed from the dataset in version 2.0. However, registries *may* include them in their data collection forms as noted above. Furthermore, the values `Administration of Spinraza` and `Administration of other disease-modifying treatment for SMA (specify, free text)` were removed in version 2.0 and replaced by `Disease-modifying therapy` as the type of therapy is already collected in the record `DMT episode`. Moreover, the values `Surgical treatment of contractures` and `Checkup` were added.

| Value ID | Description |
|---|---|
| G-tube placement | Placement of g-tube |
| Sleep study | Sleep study |
| Scoliosis surgery | Scoliosis surgery |
| Hip surgery | Hip surgery |
| Contracture surgery | Surgical treatment of contractures |
| Disease-modifying therapy | Administration of disease-modifying therapy |
| Checkup | Routine checkup |

#### Hospitalisation SAE

CR

Specifies whether the reason for the hospitalisation specified in `Hospitalisation acute reason code` was classed as a serious adverse event (SAE) in relation to a disease-modifying therapy.

Registries *should* clearly inform the data provider that completing this data item does not replace the need to report SAEs immediately via their local reporting mechanisms.

SAE = Serious Adverse Event. Any untoward medical occurrence that at any dose:

- results in death,
- is life-threatening (NOTE: The term "life-threatening" in the definition of "serious" refers to an event in which the patient was at risk of death at the time of the event; it does not refer to an event which hypothetically might have caused death if it were more severe.
- requires inpatient hospitalisation or prolongation of existing hospitalisation,
- results in persistent or significant disability/incapacity, or
- is a congenital anomaly/birth defect.

(EMA ICH E2A[19])

**Item type:** yes/no

**Related items in previous version:** 12.06

#### Hospitalisation SAE DMT

CR

Disease-modifying therapy to which this SAE was related.

**Item type:** single selection

**Related items in previous version:** 12.06

**Changes:** In version 2.0, the option Other (specify, free text) was removed because additional disease-modifying therapies will be added in future versions of the dataset when they become available.

| Value ID | Description |
|---|---|
| Nusinersen | Spinraza (nusinersen) |
| Onasemnogene abeparvovec | Zolgensma (AVXS-101) |
| Risdiplam | Evrysdi (risdiplam) |

## Comorbidities period

CR PR reference period

#### Comorbidities diagnosed

CR PR

Specifies whether the individual has been diagnosed with other comorbidities during the period from `Begin date` to `End date`. This includes any comorbidities diagnosed earlier than `Begin date` which still held during this period. In this context comorbidities are defined as any additional medical conditions occurring alongside the neuromuscular condition.

This item applies only to comorbidities that have not been recorded in `Hospitalisation acute reason code` as the reason for a hospitalisation.

[19] <https://www.ema.europa.eu/en/ich-e2a-clinical-safety-data-management-definitions-standards-expedited-reporting>

If the value of this item is `Yes`, details on each comorbidity during that period *must* be specified in instances of the record `Comorbidity`.

**Item type:** yes/no

**Related items in previous version:** 12.10

## Comorbidity

CR PR episode

This record contains details for comorbidities that held during the reference periods specified in `Comorbidities period`.

The start date of the episode *must* be the date of the diagnosis of the comorbidity specified in `Comorbidity code`, if known. The stop date of the episode *must* be the end of the symptoms of the comorbidity.

Note that the start and stop dates of comorbidity episodes *may* extend over multiple reference periods. For example, a comorbidity that held during the 12 months before the baseline entry may have been diagnosed many years earlier. Furthermore, a comorbidity that was entered at baseline may still hold at follow up; in this case, the `Ongoing date` of the episode already entered *should* be updated to the date of the follow up.

**Related items in previous version:** 12.12, 12.13

**Changes:** In version 2.1, it was clarified that the collection of details of all comorbidities that held during the reference periods specified in `Comorbidities period` is also mandatory for patient-reported registries.

### Comorbidity code

CR PR

Comorbidity as code of the classification specified in `Comorbidity classification`. Registries, in particular patient-reported registries, *may* provide common comorbidities as a list in their data collection forms or have users enter the diagnosis in a free-text field which is then coded by a curator.

**Item type:** restricted text

**Related items in previous version:** 12.11

**Changes:** As of version 2.0, it is no longer possible to use the ICD-10 chapter headings instead of specific codes. However, registries are free to offer common comorbidities in their data collection form which are automatically mapped to their respective codes.

### Comorbidity classification

CR PR

Classification used in the item `Comorbidity code`. The list of possible values may be amended in future versions of the dataset to enable the use of codes present only in local ICD-10 modifications.

**Item type:** single selection

**Related items in previous version:** 12.11

| Value ID | Description |
|---|---|
| ICD-10 | ICD-10 |
| ICD-11 | ICD-11 |
| MedDRA | MedDRA |

#### Comorbidity SAE

CR

Specifies whether this comorbidity was classed as a serious adverse event (SAE) in relation to a disease-modifying therapy.

Registries *should* clearly inform the data provider that completing this data item does not replace the need to report SAEs immediately via their local reporting mechanisms.

SAE = Serious Adverse Event. Any untoward medical occurrence that at any dose:

- results in death,
- is life-threatening (NOTE: The term "life-threatening" in the definition of "serious" refers to an event in which the patient was at risk of death at the time of the event; it does not refer to an event which hypothetically might have caused death if it were more severe.
- requires inpatient hospitalisation or prolongation of existing hospitalisation,
- results in persistent or significant disability/incapacity, or
- is a congenital anomaly/birth defect.

(EMA ICH E2A[20])

**Item type:** yes/no

**Related items in previous version:** 12.14

#### Comorbidity SAE DMT

CR

Disease-modifying therapy to which this SAE was related.

**Item type:** single selection

**Related items in previous version:** 12.15

**Changes:** In version 2.0, the option Other (specify, free text) was removed because additional disease-modifying therapies will be added in future versions of the dataset when they become available.

| Value ID | Description |
|---|---|
| Nusinersen | Spinraza (nusinersen) |
| Onasemnogene abeparvovec | Zolgensma (AVXS-101) |
| Risdiplam | Evrysdi (risdiplam) |

[20] <https://www.ema.europa.eu/en/ich-e2a-clinical-safety-data-management-definitions-standards-expedited-reporting>

# Clinical research

## Clinical trial participation

CR PR longitudinal

Specifies whether the individual is currently participating or has previously participated in an interventional clinical trial. In this context, participated means the individual has passed the screening period and has been either randomised (in randomised trial) or dosed (in non-randomised trial). If an individual fails the screening period, or is not randomised/dosed for some other reason (for example consent withdrawal, family relocation), this is not classed as participation.

**Item type:** single selection

**Related items in previous version:** 13.00

| Value ID | Description |
|---|---|
| Currently | This is currently the case |
| Previously | This has previously been the case, but is not currently |
| Never | This has never been the case, neither previously nor currently |
| Sometime | This has been the case at some time, but it is unknown whether it is currently the case |
| Not currently | This is currently not the case, but it is unknown whether it has previously been the case |

## Clinical trial

CR PR

For each clinical trial the individual is currently participating or has previously participated in (as defined in the item `Clinical trial participation`), a record instance should be provided.

### Clinical trial name

CR PR

Full name of the clinical trial that the individual is currently participating or has previously participated in.

**Item type:** free text

**Related items in previous version:** 13.01

### Clinical trial drug

CR PR

Full name of the drug that the clinical trial named in `Clinical trial name` was evaluating.

**Item type:** free text

**Related items in previous version:** 13.02

### Other registry participation

datestamped

Specifies whether the individual is currently part of another registry and/or natural history study, in addition to this registry.

A patient registry can be defined as an organized system that uses observational study methods to collect uniform data (clinical and other) to evaluate specified outcomes for a population defined by a particular disease, condition, or exposure, and that serves one or more predetermined scientific, clinical, or policy purposes. (Gliklich et al. 2014[21])

Natural history studies can be defined as epidemiological studies that focus on describing the frequency, features, and evolution of a disease by collecting real-world data from groups of patients suffering from this disease. (Bevan et al. 2019[22])

**Item type:** yes/no

**Related items in previous version:** 13.10

### Other registry

datestamped

Comma-separated list of the full name of each registry or natural history study in which the individual is currently participating.

**Item type:** free text

**Related items in previous version:** 13.11

## Motor measures

**Important note:** In addition to the mandatory motor function items in the group Motor function, clinician-reported registries *must* collect a minimum of **1 validated motor measure** for each individual.

The list of motor measures included in the item `Motor measure` below represents all validated motor measures that TREAT-NMD know to be currently in use for SMA. Registries are **not** expected to collect the full list.

Selection of appropriate motor measure(s) is at the discretion of the clinician and/or preference of the individual. Where there is no pre-existing preference, the following measures are suggested by TREAT-NMD, based on current Standards of Care and prior use in Clinical Trials:

Infantile onset SMA:

- CHOP-INTEND
- HFMS
- HFMS-E

Later onset SMA:

- HFMS-E

[21] <https://www.ncbi.nlm.nih.gov/books/NBK208616/>
[22] <https://www.evidera.com/natural-history-studies-in-rare-diseases-and-genetic-biomarkers/>

- RULM

The TREAT-NMD SMA Outcome Measure Library[23] provides registries with guidance if needed on the selection and collection of appropriate outcome measures for each individual/clinic.

Please also see the online examples.

## Validated motor measure non-evaluation reason

CR longitudinal

Main reason why a validated motor measure was not taken at the visit on which this registry update is based, if applicable.

In addition to the values listed for this item, registries *may* add further options in their data collection forms if relevant locally, and/or provide a free text field. However, additional options not specified in this dataset *must not* be provided in a data submission for a TREAT-NMD enquiry. Future revisions of this dataset may include additional values, and these can be suggested (along with justification) by using the Report an issue with this item function.

**Item type:** single selection

**Related items in previous version:** 14.01

**Changes:** The value `Other` and the related free-text field were removed from the dataset in version 2.0. However, registries *may* include them in their data collection forms as noted above.

| Value ID | Description |
|---|---|
| Start position | Inability to attain start position or disease progression |
| Illness | Injury or illness |
| Comprehension | Inability to follow or understand directions |
| Behaviour | Refusal, attention or behaviour issue |
| Fatigue | Fatigue |
| Pain | Pain or muscle cramp |
| Technical issue | Equipment or software issue |

## Motor measure

CR longitudinal

**Related items in previous version:** 14.11, 14.13, 14.15, 14.17, 14.19, 14.31, 14.33, 14.35, 14.37, 14.39, 14.41, 14.43, 14.45, 14.47, 14.49, 14.51

### Motor measure

CR

**Item type:** single selection

[23] <https://treat-nmd.org/patient-registries/treat-nmd-core-datasets/sma-core-dataset/#1590414410434-d8a182e7-a06f>

| Value ID | Description |
|---|---|
| 10MWT | 10MWT (10-Metre Walk Test), provide time in seconds |
| 6MWT | 6MWT (6-Minute Walk Test), provide distance in metres |
| 9HPT left hand | 9HPT (9-Hole Peg Test), provide time in seconds for left hand |
| 9HPT right hand | 9HPT (9-Hole Peg Test), provide time in seconds for right hand |
| ACTIVE | ACTIVE (Ability Captured Through Interactive Video Evaluation), provide scaled score |
| AIMS | AIMS (Alberta Infant Motor Scale), provide total score between 0 and 58 |
| BBT left hand | BBT (Box and Blocks Test), provide number of blocks for left hand |
| BBT right hand | BBT (Box and Blocks Test), provide number of blocks for right hand |
| Brooke | Brooke Scale of Upper Extremity Function, provide grade between 1 and 6 |
| BSID-III composite motor score | BSID-III (Bayley Scales of Infant and Toddler Development), provide composite motor development score between 40 and 160 |
| BSID-III composite motor percentile | BSID-III (Bayley Scales of Infant and Toddler Development), provide composite motor development percentile rank between 1 and 99 |
| CHOP-INTEND | CHOP-INTEND (Children's Hospital of Philadelphia Infant Test of Neuromuscular Disorders), provide score between 0 and 64 |
| EK2 | EK2 (Egen Klassification 2), provide score between 0 and 51 |
| ES9HPT left hand | ES9HPT (Endurance Shuttle Nine Hole Peg Test), provide time in seconds for left hand |
| ES9HPT right hand | ES9HPT (Endurance Shuttle Nine Hole Peg Test), provide time in seconds for right hand |
| ESBBT left hand | ESBBT (Endurance Shuttle Box and Blocks Test), provide number of blocks for left hand |
| ESBBT right hand | ESBBT (Endurance Shuttle Box and Blocks Test), provide number of blocks for right hand |
| HFMS | HFMS (Hammersmith Functional Motor Scale), provide total score between 0 and 40 |
| HFMS-E | HFMS-E (Hammersmith Functional Motor Scale Expanded), provide total score between 0 and 66 |
| HINE | HINE Section 2 (Posture) (Hammersmith Infant Neurological Examination), provide score between 0 and 18 |
| MFM-20 | MFM-20 total score (Motor Function Measurement), provide total score as percentage between 0 and 100 |
| MFM-20 D1 | MFM-20 D1 (Motor Function Measurement), provide domain score as percentage between 0 and 100 |
| MFM-20 D2 | MFM-20 D2 (Motor Function Measurement), provide domain score as percentage between 0 and 100 |
| MFM-20 D3 | MFM-20 D3 (Motor Function Measurement), provide domain score as percentage between 0 and 100 |
| MFM-32 | MFM-32 total score (Motor Function Measurement), provide total score as percentage between 0 and 100 |

| Value ID | Description |
|---|---|
| MFM-32 D1 | MFM-32 D1 (Motor Function Measurement), provide domain score as percentage between 0 and 100 |
| MFM-32 D2 | MFM-32 D2 (Motor Function Measurement), provide domain score as percentage between 0 and 100 |
| MFM-32 D3 | MFM-32 D3 (Motor Function Measurement), provide domain score as percentage between 0 and 100 |
| r9HPT left hand | r9HPT (Repeated Nine-Hole Peg Test), provide average time of five rounds in seconds for left hand |
| r9HPT right hand | r9HPT (Repeated Nine-Hole Peg Test), provide average time of five rounds in seconds for right hand |
| Revised Brooke left side | Revised Brooke Scale of Upper Extremity Function, provide score between 0 and 6 for left side |
| Revised Brooke right side | Revised Brooke Scale of Upper Extremity Function, provide score between 0 and 6 for right side |
| RHS | RHS (Revised Hammersmith Scale), provide total score between 0 and 69 |
| RULM left side | RULM (Revised Upper Limb Module), provide score between 0 and 37 for left side |
| RULM right side | RULM (Revised Upper Limb Module), provide score between 0 and 37 for right side |
| TIMPSI | TIMPSI (Test of Infant Motor Performance Screening Items), provide score between 0 and 99 |
| TUG | TUG (Timed Up and Go), provide time in seconds |
| Vignos | Vignos functional rating scale, provide score between 1 and 10 |
| WHO Motor Milestones | WHO (World Health Organisation) Motor Milestones (observed in clinic), provide score between 0 and 6 |

**Motor measure score**

CR

The `Motor measure` value description specifies the unit in which the outcome *must* be provided.

**Item type:** decimal

**Related items in previous version:** 14.10, 14.12, 14.14, 14.16, 14.18, 14.30, 14.32, 14.34, 14.36, 14.38, 14.40, 14.42, 14.44, 14.46, 14.48, 14.50

## Dominant hand

The individual's dominant hand. A value *must* be provided if `Motor measure` contains a value for a motor measure that is reported separately for each hand. These measures currently include 9HPT (9-Hole Peg Test), BBT (Box and Blocks Test) and their variations.

**Item type:** single selection

**Changes:** This item was added in version 2.0.

| Value ID | Description |
|---|---|
| Left | Left hand |
| Right | Right hand |
| Ambidextrous | Ambidextrous |

# Patient-reported outcome measures

## Patient Global Impression of Severity

CR PR longitudinal

Patient Global Impression of Severity (PGI-S) according to individual, or according to a caregiver answering on behalf of the individual: *Select the option that best describes how affected you are now by your SMA.*

This item *should* be captured once per patient; after that, `Patient Global Impression of Improvement` *should* be captured at each update. Even though there will, therefore, usually be only one value of this item for each individual, it is marked as longitudinal instead of datestamped to account for registries who choose to collect the value more than once for an individual.

**Item type:** single selection

**Changes:** This item was added in version 2.0.

| Value ID | Description |
|---|---|
| Not at all | Not at all affected |
| Mildly | Mildly affected |
| Moderately | Moderately affected |
| Severely | Severely affected |

## Patient Global Impression of Improvement

CR PR longitudinal

Patient Global Impression of Improvement (PGI-I) according to individual or caregiver: *How does the individual/caregiver feel that the individuals condition has changed in the last 6 months?*

**Item type:** single selection

**Related items in previous version:** 15.02, 15.03

| Value ID | Description |
|---|---|
| 1 | Very much improved |
| 2 | Much improved |
| 3 | Minimally improved |
| 4 | No change |
| 5 | Minimally worse |
| 6 | Much worse |

| Value ID | Description |
|---|---|
| 7 | Very much worse |

### Patient-reported outcome measure

longitudinal

**Related items in previous version:** 15.12, 15.14, 15.16, 15.18, 15.20, 15.22

#### Patient-reported outcome measure

**Item type:** single selection

| Value ID | Description |
|---|---|
| ACEND | ACEND (Assessment of Caregiver Experience with Neuromuscular Disease) |
| ACTIVLIM | ACTIVLIM (Measurement of Activity Limitations), provide score between 0 and 36 |
| CarerQol7D | CarerQol7D |
| DISABKIDS | DISABKIDS (Measurement of Quality of Life and Level of Distress) |
| EQ-5D-5L state | EQ-5D-5L health state, provide 5-digit code |
| EQ-5D-5L VAS | EQ-5D-5L VAS, provide score between 0 and 100 |
| FSS | FSS (Fatigue Severity Scale) |
| PEDI-CAT | PEDI-CAT |
| PedsQL 3.0 Neurosmuscular Module | PedsQL 3.0 Neurosmuscular Module, provide score between 0 and 100 |
| PedsQL Multidimensional Fatigue Scale | PedsQL Multidimensional Fatigue Scale, provide score between 0 and 72 |
| PROMIS | PROMIS (Patient-Reported Outcomes Measurement Information System) |
| SMA FRS | SMA FRS (SMA Functional Rating Scale) |
| SMA HI | SMA HI (SMA Health Index) |

#### Patient-reported outcome measure score

The `Patient-reported outcome measure` value description specifies which type of score *must* be provided.

**Item type:** decimal

**Related items in previous version:** 15.11, 15.13, 15.15, 15.17, 15.19, 15.21

## Electrophysiology and biomarkers

The purpose of these items is only to collect in the Global Registry whether this data exists in the local registry, and therefore to allow further research if necessary. Registries are, as always, free to collect the actual results if relevant and feasible locally.

## CMAP performed

datestamped

Specifies whether the individual has ever had a CMAP (Compound Muscle Action Potential) investigation.

The CMAP (Compound Muscle Action Potential) scan is a non-invasive electrodiagnostic tool, which provides a quick and visual assessment of motor unit potentials as electrophysiological components that together constitute the CMAP. The CMAP scan records the electrical activity of the muscle (CMAP) in response to transcutaneous stimulation of the motor nerve with gradual changes in stimulus intensity. (Maathuis et al. 2012[24])

**Item type:** yes/no

**Related items in previous version:** 16.00

## DEXA performed

datestamped

Specifies whether the individual has ever had a DEXA (Dual Energy X-ray Absorptiometry) scan.

Bone densitometry, also called dual-energy x-ray absorptiometry, DEXA or DXA, uses a very small dose of ionizing radiation to produce pictures of the inside of the body (usually the lower (or lumbar) spine and hips) to measure bone loss. It is commonly used to diagnose osteoporosis, to assess an individual's risk for developing osteoporotic fractures. (RadiologyInfo.org[25])

**Item type:** yes/no

**Related items in previous version:** 16.01

## Muscle imaging performed

datestamped

Specifies whether the individual has ever had any muscle imaging undertaken.

Commonly used skeletal muscle imaging techniques include radiography, ultrasound, computed tomography, and MRI. Newer techniques include T2 mapping, blood oxygenation level dependent imaging, diffusion tensor imaging, and magnetic resonance spectroscopy. (Kuo et al. 2007[26])

**Item type:** yes/no

**Related items in previous version:** 16.02

[24] <https://doi.org/10.1186/1749-7221-7-4>
[25] <https://www.radiologyinfo.org/en/pdf/dexa.pdf>
[26] <https://doi.org/10.1097/bor.0b013e3282efdc66>