User Manual

User Manual and General Instructions for researchers finding CENTER-TBI data in Mica and Opal

Version number	Purpose/Change	Author	Date
1.0	Initial draft, proof reading, extended draft, testing, finalization	Merijn Driessen, LUMC Judith Manniën, LUMC Eva Timmermans, LUMC Véronique De Keyser, UZA	Between 24-08-2021 and 09-03-2022
1.1	Revision by Mica/Opal test-users	Francesca Graziano, UNIMIB Véronique De Keyser, UZA Merijn Driessen, LUMC	Between 20-04-2022 and 20-06-2022
2.0	Changes for update to Mica 5.0, use of R token added.	Merijn Driessen, LUMC, Kristel Schaap, LUMC	13-10-2022

Table of Contents

1. Introduction

The CENTER-TBI study data were collected in 69 sites in Europe, Israel, India, and Australia.

- The **CENTER-TBI (Europe and Israel)** dataset is composed of two parts:
  - The CENTER-TBI Registry (n= 22 782)
  - The CENTER-TBI Core (n= 4509)

- The **OzENTER (Australia)** dataset is composed of one part:
  - The OzENTER Core (n= 198)

- The **CINTER-TBI India** dataset is composed of two parts:
  - The CINTER-TBI India Registry (n= 3 904)
  - The CINTER-TBI India Core (n= 1 046)

The *Registry dataset* serves to validate and generalize results of the Core dataset.

All datasets were collected using the same e-CRF and the same inclusion criteria. The Australian and Indian dataset are more limited than the European dataset. For logistic reasons, not all variables from CENTER-TBI have been captured in the dataset of Australia and India.

This is a non-exhaustive list of data that was not or less captured in Australia:

- only ICU stratum (no ER or ADM stratum)
- only CT scans in acute phase (no MRI substudy)
- no lab sampling performed
- only waiver of consent, no confirmation of consent
- no registration of other studies, other registries or associated trials
- no physician concern recorded in TIL
- only 6 and 12month outcome
- only GOSE and SF-12 performed as outcome assessments (at 6/12 month only)
  → this means: no capture of follow up surgical data, follow up medications, follow up rehab data, follow up socio-economic data, …

This is a non-exhaustive list of data that was not or less captured in CINTER (India):

- only CT scans in acute phase (no MRI substudy)
- no lab sampling performed
- no registration of ICD codes
- no brain monitoring
- only 3 and 6 month outcome
- only questionnaires performed as outcome assessments (at 3/6 month)
- Structured Reporting of CT scans not performed (yet)

For *the Core dataset*, sites were able to participate in one or more of the three strata that are differentiated according to care path:

- Patients seen in the Emergency Room and discharged [ER]
- Patients primarily admitted to the hospital ward (non-ICU) [Adm]
- Patients primarily admitted to the ICU [ICU]

Important remark: the stratum is allocated at presentation based on planned care paths. However, possibility exist that a patient allocated to for example the ER stratum, was still admitted to WARD or ICU in a later stage of his care path due to worsening.

In addition, a number of sub-studies were performed: some patients received extensive MRI imaging and some patients received High Resolution monitoring. Inclusion in these sub-studies was centre specific.

Patients in the Core dataset had extensive follow up assessments that could go up to 2 years after enrolment. The type and timepoints of follow up assessments depend on the strata and sub-studies (see below overview).

Type A: questionnaires only	**Type B: questionnaires + neuropsychological assessment**
- Participant Q A - GOSE questionnaire - GOSE interview - SF12 - SF36 - Qolibri - PCL-5 - RPQ - PHQ-9 - GAD-7	- Participant Q A - GOSE questionnaire - GOSE interview - SF12 - SF36 - Qolibri - PCL-5 - RPQ - PHQ-9 - GAD-7 - Participant Q B - GOAT - RAVLT - TMT + RAVLT - Mobility - CRS-R

	2-3 wks	**3 months**	**6 months**	**12 months**	**24 months**
ER non MR*	A	A	B		
ER MR*	B	B	B		
Adm non MR*		A	B	A	
Adm MR*	A	A	B	B	B
ICU non MR*		A	B	A	
ICU MR*		A	B	B	B

*non MR: patient did not receive extensive MRI imaging / MR: patient did receive extensive MRI imaging
See previous table for A (type A) and B (type B) specifications

The overall time points of assessments and investigations differentiated by stratum and sub-studies is presented below. **You can find an interactive version of this table on the last page of this document**.

CENTER-TBI Core Data Collection : Guide to timing of assessments and investigations differentiated by stratum + Early MR imaging + Ultra early MR + External completion studies

	TIME POINT		Day 1 (Adm)*	Post-op	Day 2	Day 3	Day 4	Day 5	2-3 Week	3 Month	6 Month	12 Month	24 Month
CORE DATA	**ER STRATUM: 1800**												
MR	**Clinical data : on presentation/discharge ER and at time of follow-up**												
	Blood Sampling	Routine hospital	All										
		Biomarkers	All						MR Sites	MR Sites[2]			
		Genetics	All										
		ROTEM/TEG[3]	ROTEM/TEG[3]										
	MRI (only MR sites)			Ultra early MR					MR Sites	MR Sites[2]			
	Outcome Measures	Neuropsych							MR Sites	MR Sites[2]	All		
		Questionnaires							All	All(F2F)	All		
Ultra Early MR	**ADMISSION STRATUM: 1800**												
	Clinical data : on presentation, day 1-7, day 10, day 14, day 21 and day 28 unless discharge earlier												
	Blood Sampling	Routine hospital	All						MR Sites				
		Biomarkers	All								All	MR Sites	MR Sites
		Genetics	All										
		Ext. Coag[3]	Ext. Coag[3]										
	MRI (only MR sites)			Ultra early MR					MR Sites		MR Sites	MR Sites	MR Sites
	Outcome Measures	Neuropsych									All	MR Sites	MR Sites
		Questionnaires							MR Sites	All	All	All	MR Sites
HR ICU	**ICU STRATUM: 1800**												
	Clinical data : on presentation, day 1-7, day 10, day 14, day 21 and day 28 unless discharge earlier												
	Blood Sampling	Routine hospital	All		All	All	All	All					
		Biomarkers	All		All	HR ICU	HR ICU	HR ICU	MR Sites		All	MR Sites	MR Sites
		Genetics	All										
		Ext. Coag[3]	Ext. Coag[3]	Ext. Coag[3]	Ext. Coag[3]								
Extended Coagulation	MRI (only MR sites)			Ultra early MR					MR Sites		MR Sites	MR Sites	MR Sites
	Outcome Measures	Neuropsych									All	MR Sites	MR Sites
		Questionnaires								All	All	All	MR Sites

Day 1 = Defined as day of Admission; in most cases this will be the same as day of injury, but in some (those patients presenting in the evening) it may be the next day.
Day 2 = Day after Admission
HR ICU: only sites participating in the HR ICU sub-study
[2] Initially target all patients scanned at 2-3 weeks, may later be restricted to only those with an abnormal MR at 2-3 weeks
[3] only sites participating in the extended coagulation sub-study

2. Understanding e-CRF, forms and variables

As the CENTER-TBI data consists of a large number of variables (over 2500 clinical variables alone), it is important to have an understanding about the overall structure of the e-CRF, the different data collection forms, and the associated variables in order to identify the relevant variables and export them.

The main structure of the e-CRF consists of data related to:

- The patient type, injury, and enrolment
- The pre-hospital and presentation status
- Additional Ward or ICU data (depending on the type of patient)
- Additional MRI or HR ICU data (depending on the sub-studies performed)
- Transitions of care
- Treatment (labs, medication, surgery)
- Outcome assessments

More details can be found in the study protocol: Maas et al. Collaborative European NeuroTrauma Effectiveness Research in Traumatic Brain Injury (CENTER-TBI), *Neurosurgery. 2015 Jan;76(1):67-80* doi: 10.1227/NEU.0000000000000575

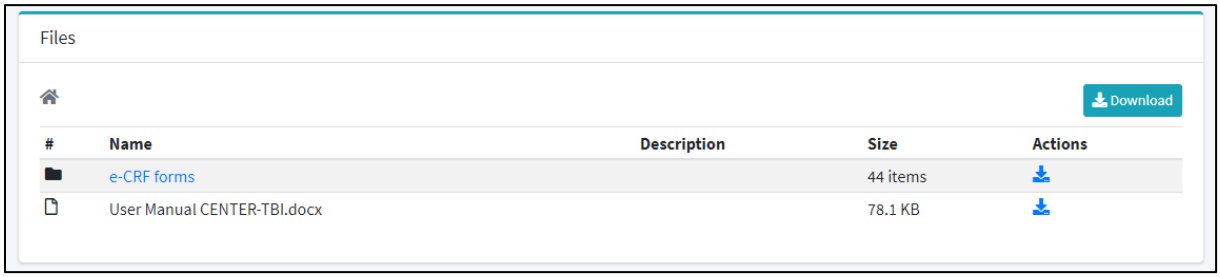
The categories/domains used in the data collection regrouping variables are:

Domain/Dataset	**Details**
AIS	Abbreviated Injury Scale details
Biomarkers	Metadata and results from biomarkers samples
Brainmonitoring	Metadata from ICU files
CTMRI	Imaging CT/MRI details, contains data in session/experiment level. We recommend however using “Imaging” domain.
CentralHaemostasis	Metadata and results from Central Haemostasis samples
DailyTIL	Daily Therapy Intensity Level
Genetics	Metadata from genetics samples
Imaging	Imaging details, CTMRI domain contains data in session/experiment level, whereas Imaging domain has data in scan level. This also contains metadata from scans including header and QC information and structured reporting
InjuryHx	Injury details including details coming from Cause of injury, ER therapy and discharge, ER arrival status, Second insults, Neurological assessments and Behavioral history
Labs	Lab values coming from ICU, ER and Admission labs.
LabSampling	Blood sampling data collection details
FollowUp	Patient follow up details coming from Unscheduled follow up, Follow up appointments, ER Therapy and discharge, Hospital discharge forms

Hospital	Hospital discharge and ICU monitoring details
HourlyValues	Vitals measured every second hour
HourlyMeasurements	Hourly values in long format with datetime
MedHx	Medical History prior to the accident
Medication	Therapies and medications during the hospital stay
Meds	Medication during the hospital stay
Outcomes	Outcomes details coming from Follow up appointments, Outcome Assessments, Rivermead RPQ, Rivermead Assessment RPQ, GOSE Structured Interview, GOSE Questionnaire, QoLIBRIOS, QoLIBRI, GAD-7 Anxiety, PCL5, PHQ9 Depression, SF12, SF36, TMT RAVLT, 10m Walk & Timed Up and Go, JFK CRSR
PriorMeds	Medical History prior to the accident
Subject	Patient details coming from Informed Consent, Demographics and Socioeconomic Status, ER therapy and discharge, Hospital Discharge, Vitals Target Dates, Neurological Assessments, Follow up appointments
Surgeries	Surgery details
SurgeriesCranial	Cranial surgery details
SurgeriesExtraCranial	Extracranial surgery details
TransitionsOfCare	Transition of care and ward admission details
Vitals	Daily Vitals, GCS, Four Score, Second Insults details

Click on the following link or the image to access the e-CRF forms.

Access the e-CRF forms



Read the Annex of this manual for more details on specifically the imaging data, outcome data, HR ICU data and biomarkers data.

3. Data anonymization

The CENTER-TBI data is anonymized, the images are de-faced and the variables are associated with individual patients based on the Global Unique Personal Identifier (GUPI). As part of the anonymization, the following elements are modified or not available.

- Site identifier - Not available; however an anonymized site code is available.
- Country - Not available
- Dates - Date of Injury of all the subjects are made to 1st January 1970 and other dates are shifted relative to the date of injury
- Free text - all of the identifiable information were either modified or removed

4. Baseline derived variables

As baseline and for risk adjustment we recommend using the following variables:

- InjuryHx.PupilsBaselineDerived
- InjuryHx.GCSScoreBaselineDerived
- InjuryHx.GCSMotorBaselineDerived

For outcome, we recommend using:

- Subject.GOSE6monthEndpointDerived

For predictive modelling, the imputed variable might be preferred (see annex 3):

- Subject.DerivedImputed180DaysGOSE

5. Data access requests

For data access requests, submit a study plan proposal on the CENTER-TBI website: https://www.center-tbi.eu/data.

6. About Mica and Opal

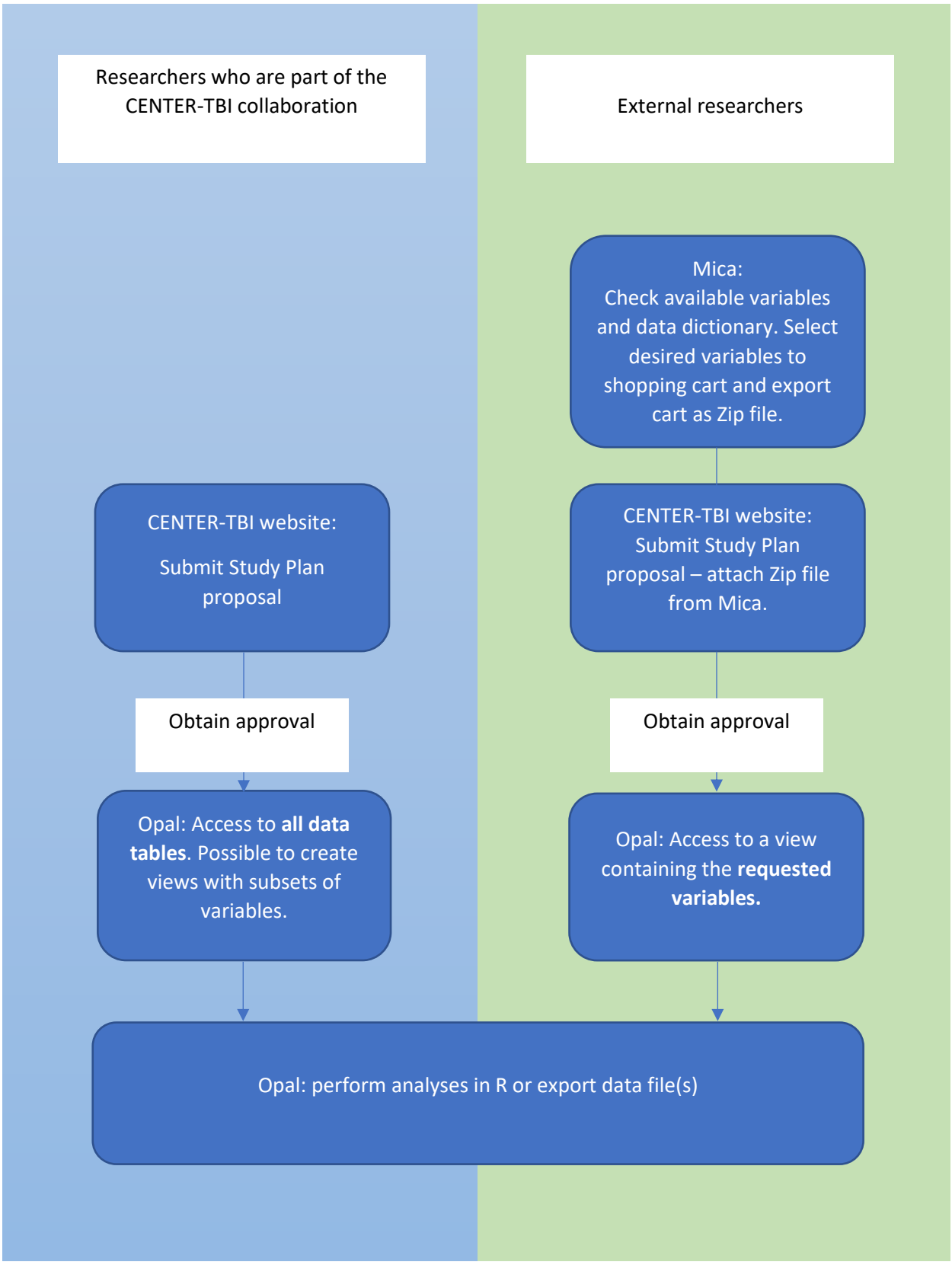
Mica and Opal are part of the Obiba open source software suite.

Mica is an online data portal that includes the study catalogue and a searchable variable dictionary giving insight into the CENTER-TBI dataset. It also provides additional information on the study goals, design and participants.

The data dictionary, available in Mica and through the CENTER-TBI website, provides:

- A description of each variable, including measurement methods, unit type and entity type (i.e. level on which the variable was measured)
- The option groups / look-up values
- The location in the e-CRF
- A link to the e-CRF's.
- Any relevant remarks concerning the curation of variables
- Frequency tables giving some orientating insight into the availability and distributions of the data (see also annex 6)

Opal is the data warehouse where you can view datasets and export & download the data, or connect your R session to the Opal server via an application programming interface (API). Because of its integration with R, complex statistical analysis and reports can be performed within Opal as well.



Flowchart showing paths to data access

7. Mica

The Mica environment is an online data catalog and portal to provide insight into the CENTER-TBI dataset. It has a direct connection to the Opal data warehouse.
You can find the CENTER-TBI Mica portal at https://opal.center-tbi.eu/pub/.

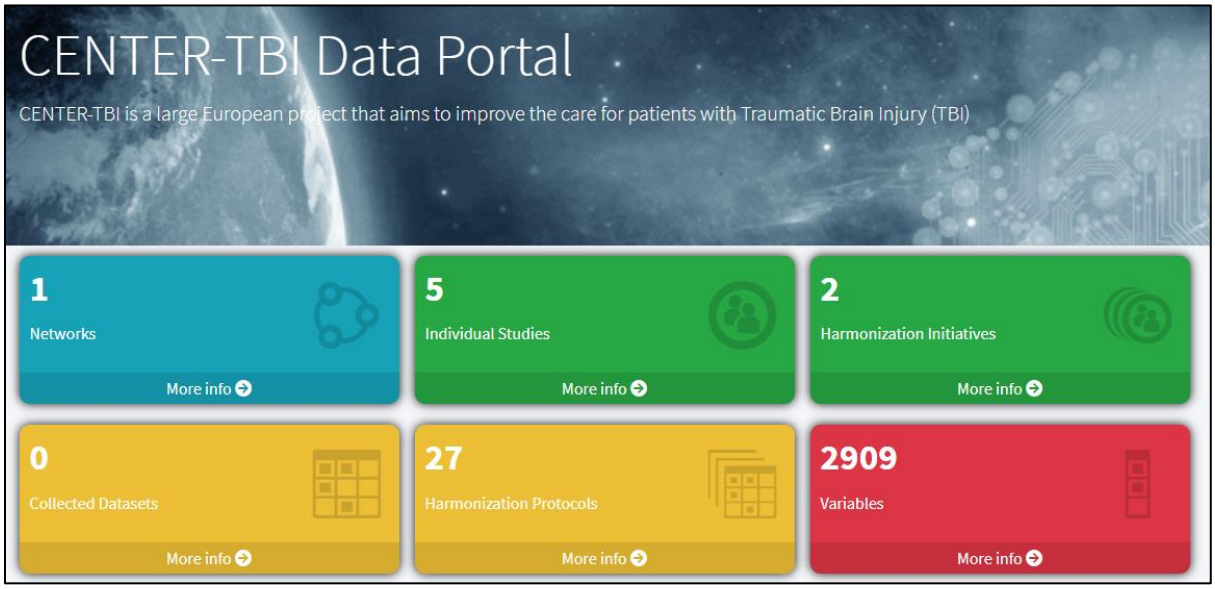
7.1 Log in

Logging in is not necessary to enter the Mica portal or to request variables. You can log in in Mica with your CENTER-TBI account if you like to store your lists of requested variables.

7.2 The Mica environment

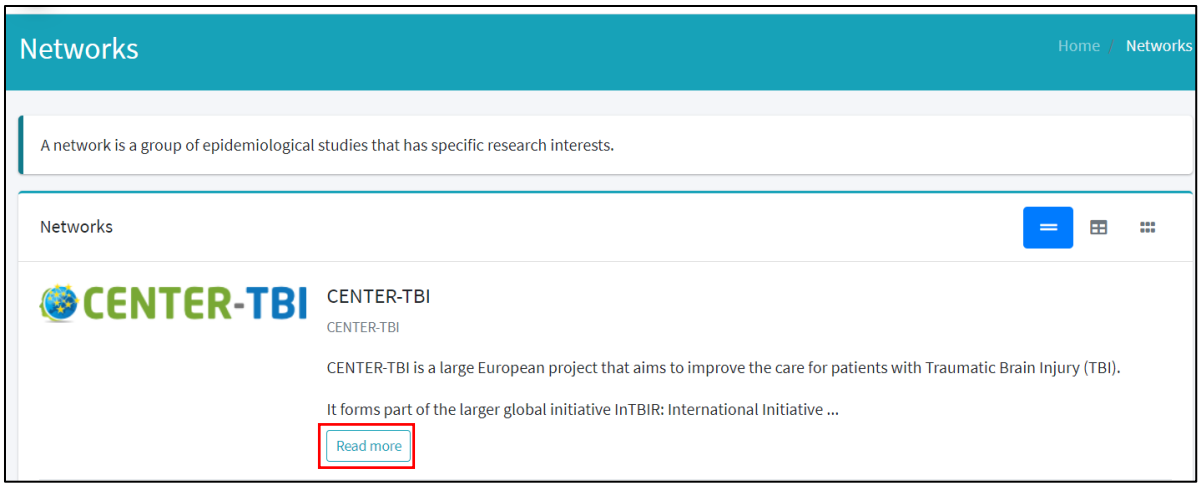
On the CENTER-TBI Mica homepage you can see the main building blocks of Mica:

- Networks,
- Studies and Initiatives,
- Datasets and Protocols (=corresponding to the domains on p. 7-8) and
- Variables.

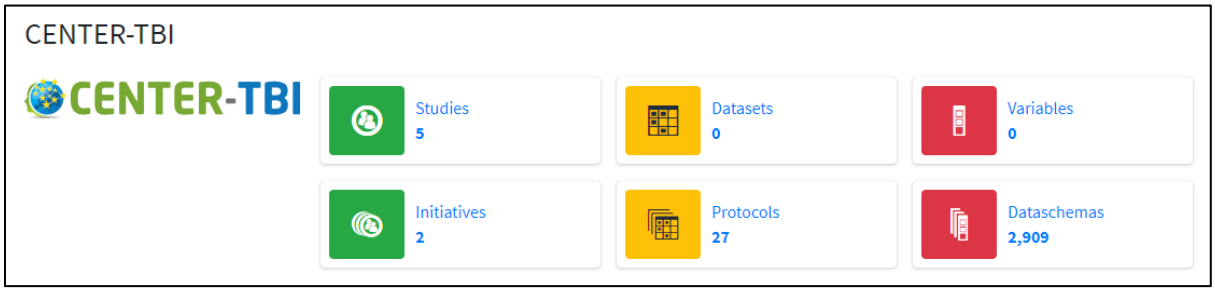


7.2.1 Networks, Studies, Initiatives, Protocols and Variables

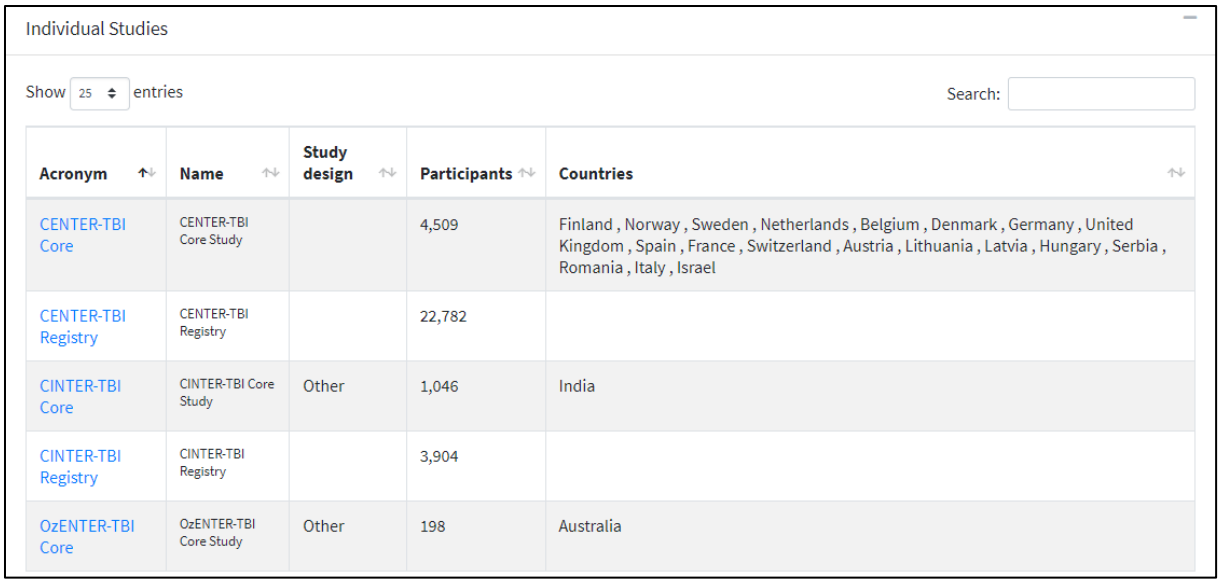
The network is the overarching umbrella that houses the various studies. By clicking on networks, you can find the CENTER-TBI network. Click on ‘Read more’ to navigate to the network page.



The network page shows an overview of the number of studies, initiatives, datasets, protocols and variables within the CENTER-TBI network.

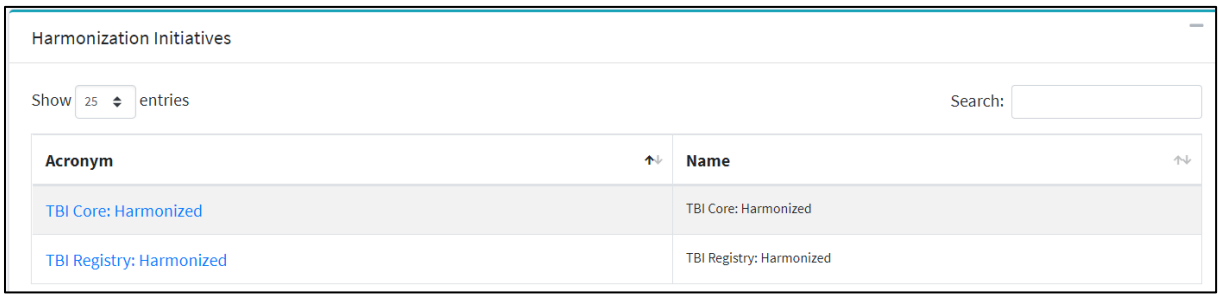


The network currently holds 5 individual studies: CENTER-TBI Core, CENTER-TBI Registry, OzENTER Core, CINTER Core and CINTER Registry. By clicking on one of these studies, you will be taken to the study-specific page.
The study pages of the individual studies show information on the study details, including study design, the timeline, the number of participants and availability of data.

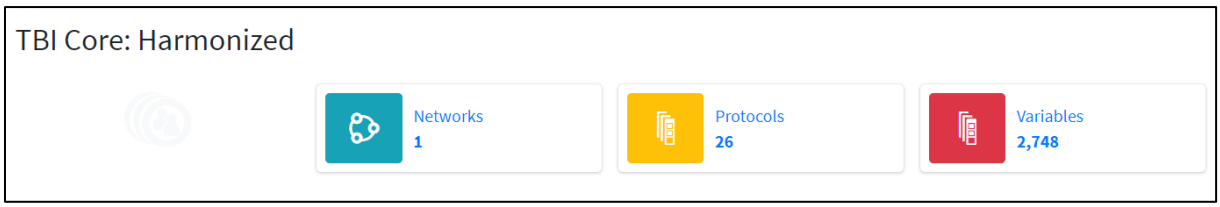


Acronym	Name	Study design	Participants	Countries
CENTER-TBI Core	CENTER-TBI Core Study		4,509	Finland , Norway , Sweden , Netherlands , Belgium , Denmark , Germany , United Kingdom , Spain , France , Switzerland , Austria , Lithuania , Latvia , Hungary , Serbia , Romania , Italy , Israel
CENTER-TBI Registry	CENTER-TBI Registry		22,782	
CINTER-TBI Core	CINTER-TBI Core Study	Other	1,046	India
CINTER-TBI Registry	CINTER-TBI Registry		3,904	
OzENTER-TBI Core	OzENTER-TBI Core Study	Other	198	Australia

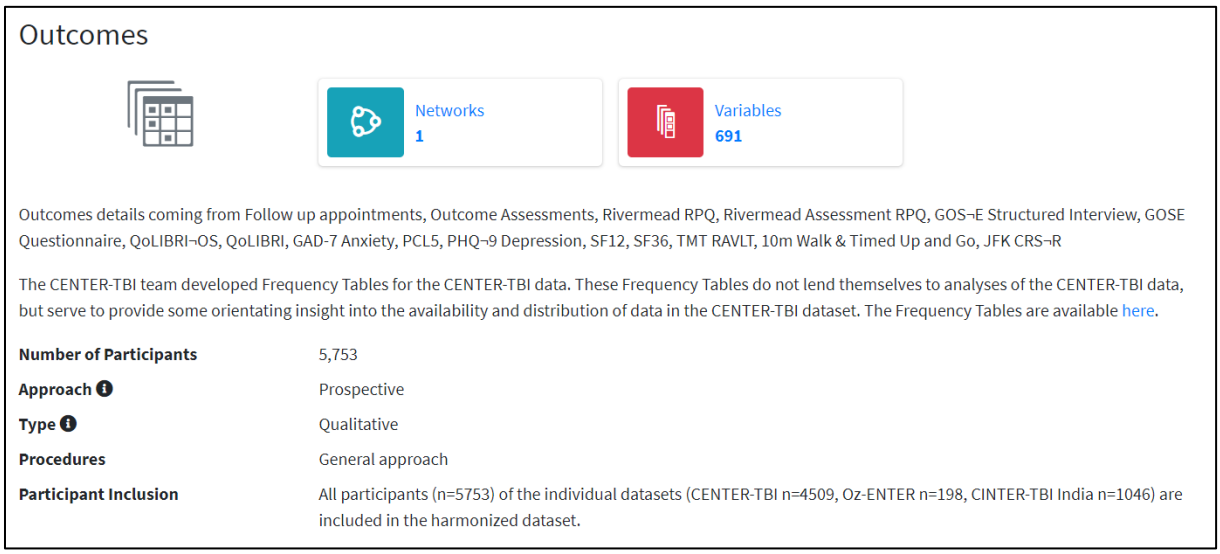
Note that the individual study pages do not include information about the actual datasets and collected variables; you can find these in the Harmonized Initiatives.
The Center-TBI network contains 2 overarching Harmonized Initiatives: 'TBI Core: Harmonized' and 'TBI Registry: Harmonized'. You can find these at the bottom of the Network page, under 'Harmonization Initiatives', or on the homepage behind the green box.



To see the specific datasets or variables that belong to the Center-TBI studies, select one of the Harmonization Initiatives and click on the icons for Protocols or Variables. This will guide you to the search environment, where all protocols and variables are listed.



The protocols are equal to the data tables that belong to each study (see also domains on p. 7-8). Clicking on a protocol shows information on the contents of the dataset and shows the number of variables that make up de dataset. An example of a dataset ('Outcomes') can be seen in the following figure:



The studies for which this dataset has been harmonized can be found under 'Studies Included' (under each "Dataset"). Here you can click on the study, population or data collection event for more information on the included studies.

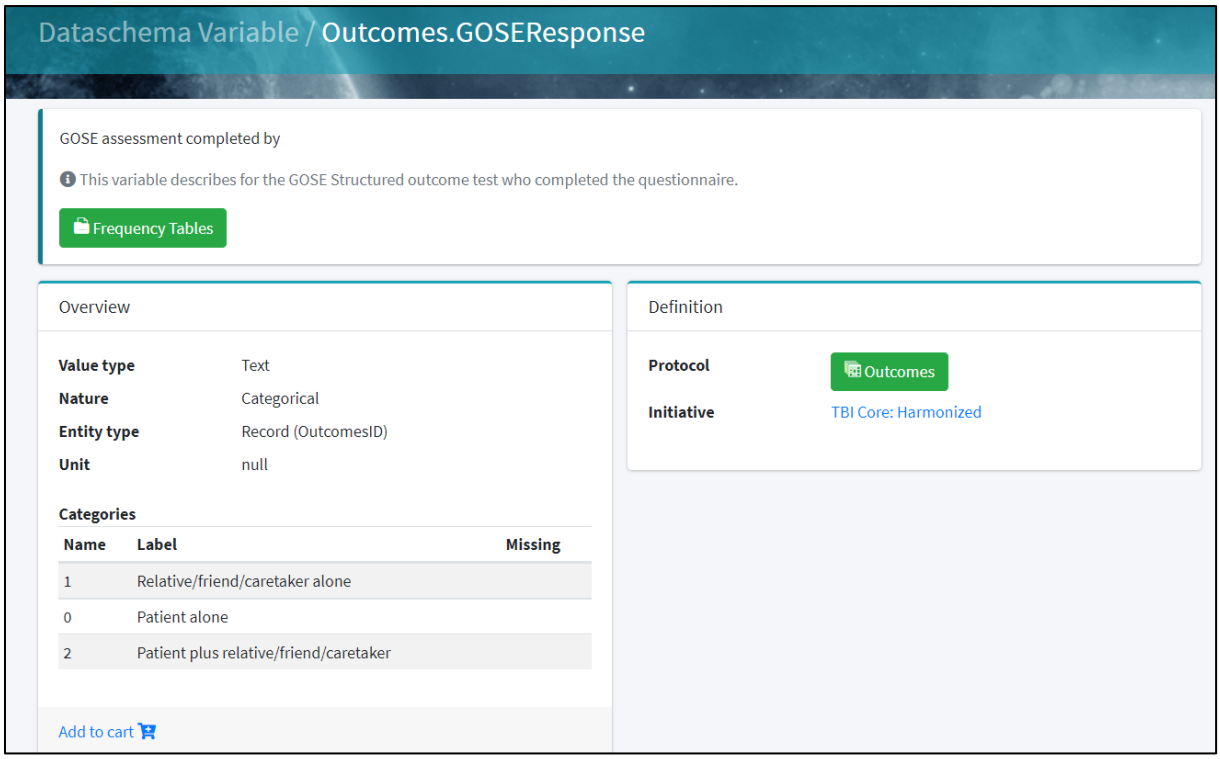
Studies Included

Study	Population	Data Collection Event
CENTER-TBI Core	TBI patients CENTER-TBI Core	CENTER-TBI data collection
CINTER-TBI India Core	TBI patients CINTER-TBI	CINTER-TBI India data collection
OzENTER-TBI Core	TBI patients OzENTER-TBI	OzENTER-TBI data collection

At the bottom of the protocol page you can find an overview of the harmonization. It shows which variables in this protocol are available from the different included studies. Some variables will only be available in the CENTER-TBI study, since they were not collected in CINTER-TBI India and OzENTER-TBI. This overview can also be downloaded by clicking the download button.

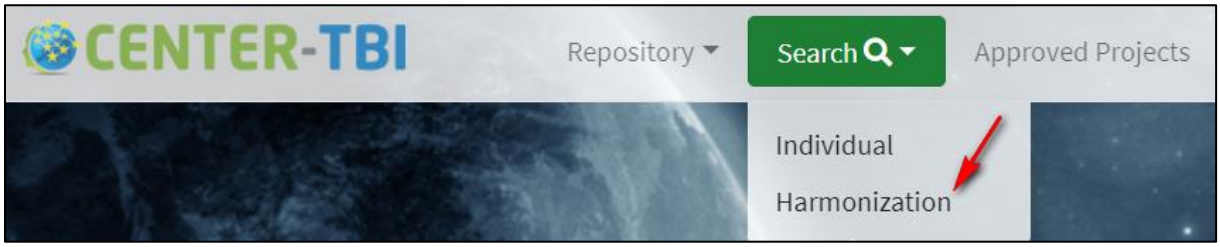
Variable	CENTER-TBI Core CENTER-TBI Outcomes	CINTER-TBI India Core CINTER-TBI Outcomes	OzENTER-TBI Core OzENTER-TBI Outcomes
Outcomes.OutcomesID	✓	✓	✓
Outcomes.SubjectID	✓	✓	✓
Outcomes.Timepoint	✓	✓	✓
Outcomes.GOSEDate	✓	✓	✓
Outcomes.GOSEQuestionnaireMode	✓	✓	✓
Outcomes.GOSEResponse	✓	✓	✓

The protocol page also includes a list the variables collected in this protocol. If you click on one of the variables in the list, you will be directed to an overview page for the selected variable, providing you with extra insight into its metadata, based on the CENTER_TBI data dictionary.

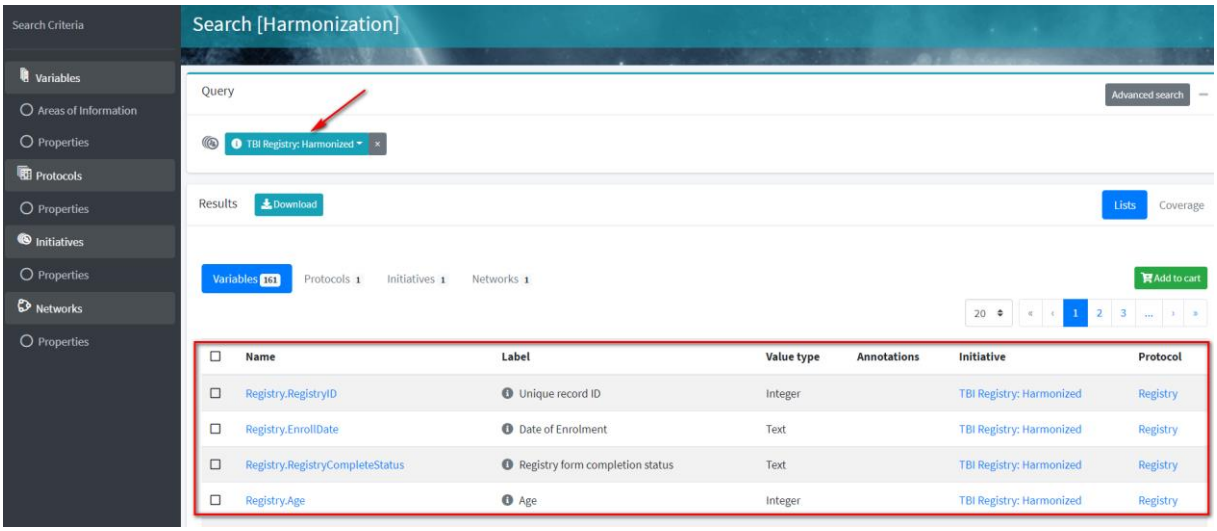


7.2.2 The search environment

To search for variables or protocols, click on the green Search button on the top of the screen and select 'Harmonization'.



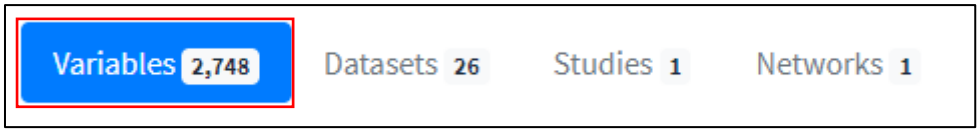
You can also get to the search environment if you click on the red 'Variables' box on the Mica homepage or another page. Depending on where you do this, the search environment will automatically filter for that selection. For instance, when you are in the 'TBI Registry: Harmonized' project and click on the red 'Variables' box, the search environment will automatically list all variables within TBI Registry:



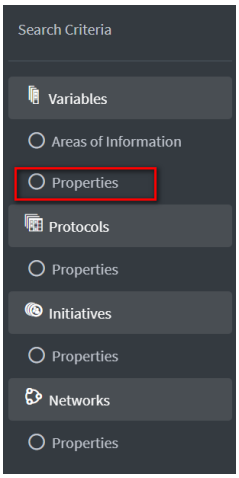
Clicking on any of the shown search results (highlighted in the red box above) will take you back out of the search environment and to the page of your selected variable, protocol or harmonization initiative.

7.2.3 Searching within the search environment

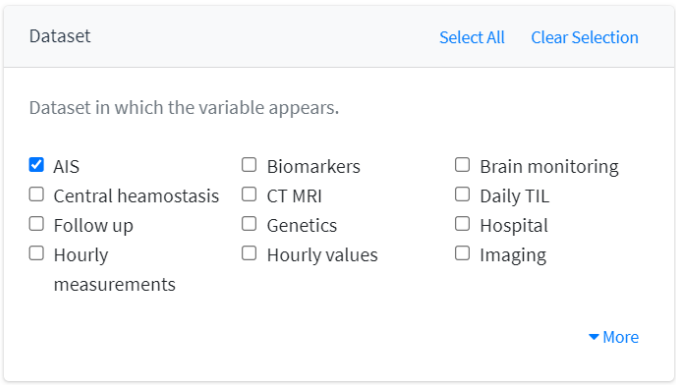
The search environment gives you the ability to search for specific Harmonization Initiatives, datasets (here named Harmonization Protocols) or variables.
When searching within the search environment, make sure that you select the right level. For instance, when you want to search variables, you need to select the 'Variables' button :



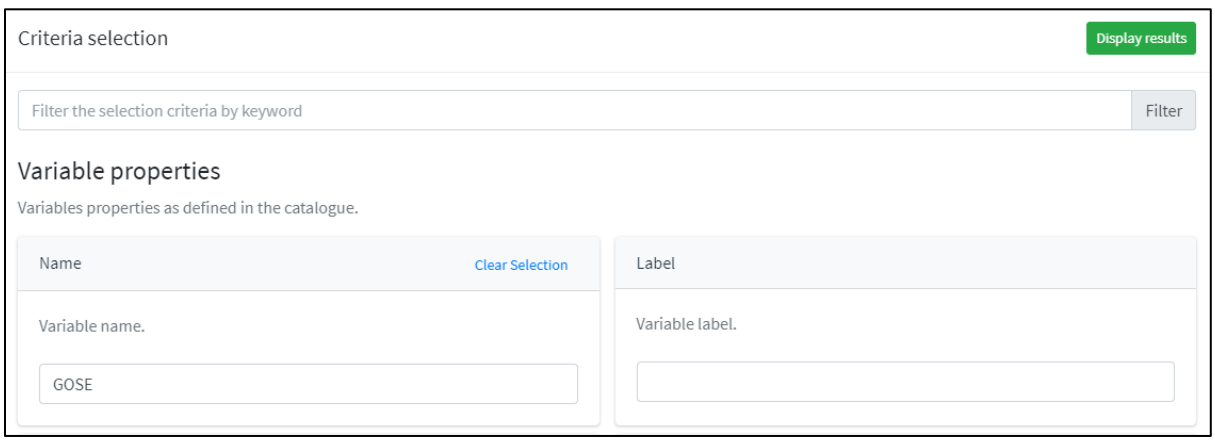
By making use of the properties buttons in the search criteria menu on the left, you can narrow down your search.



For instance, when you click on *Properties* under *Variables*, you can narrow down your selection by Study, Dataset or data type or search for parts of the variable name or variable label.
For example, by selecting the Dataset AIS, it will show only the available variables within the AIS table.

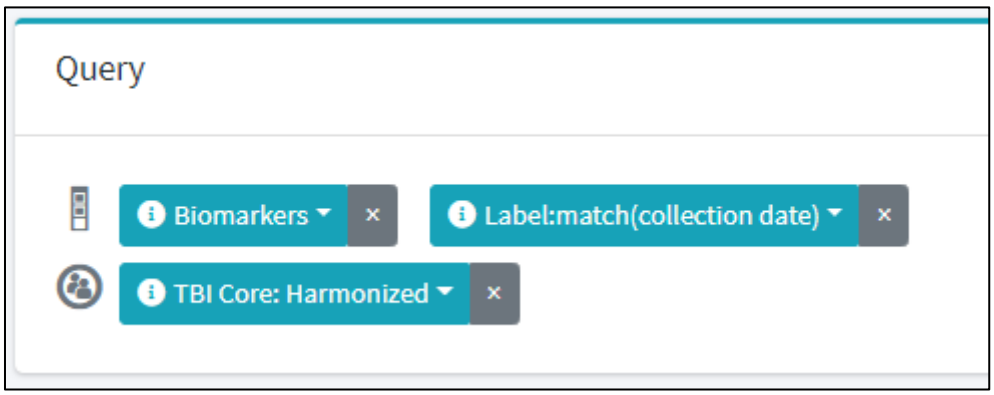


You can also search for specific variables, using (part of) the variable name or label.



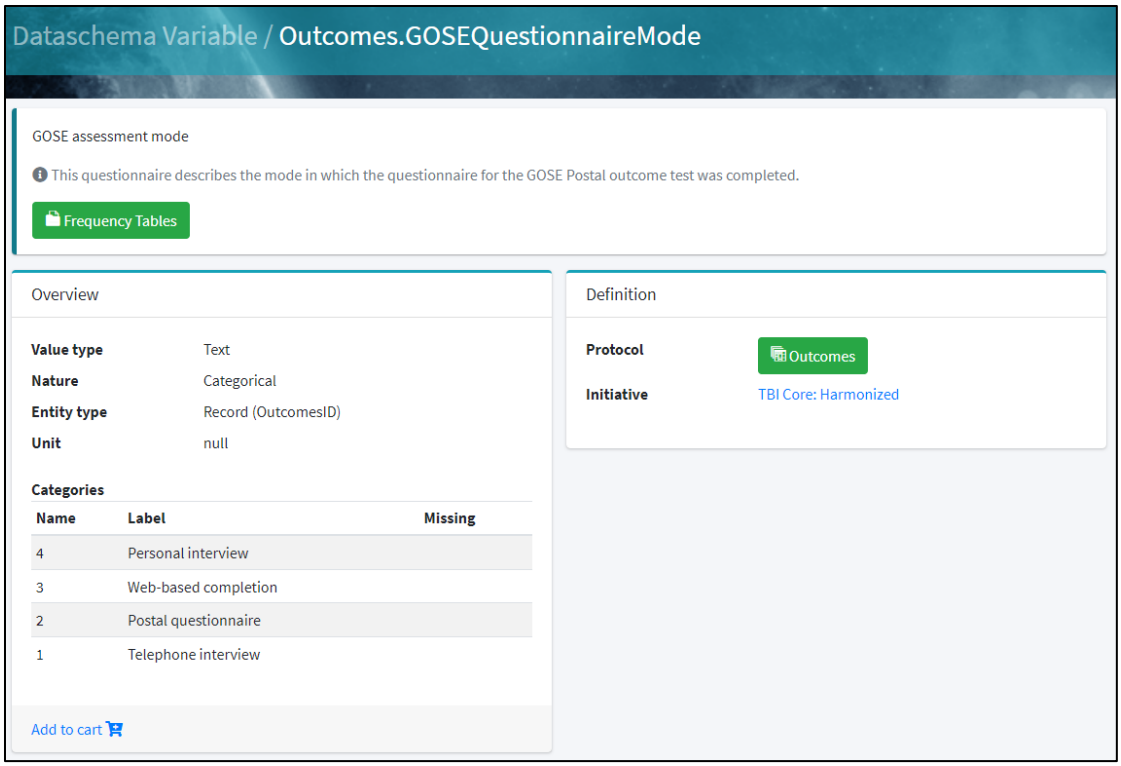
After specifying your selection, click ‘Display results’ on the top right of the window.

By using a combination of variable names/labels and studies or datasets, you will always be able to find the correct variable. The selection criteria that you chose will be shown at the top, under ‘Query’.



By clicking on the criteria, you open a small menu where you can always alter your criteria, and further specify the request. By clicking the crosses, you can quickly remove unwanted criteria.

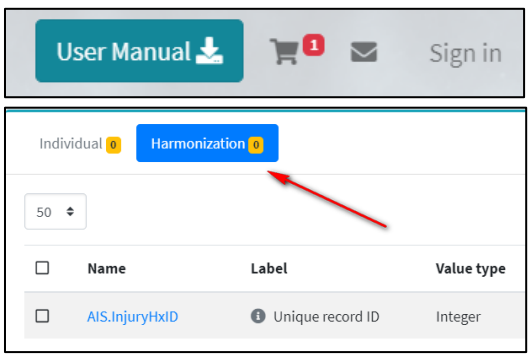
Once you have found your chosen variable, you can click on the name to be directed to an overview page for the selected variable, providing you with extra insight into its metadata, based on the CENTER_TBI data dictionary.



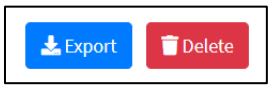
8. Data access requests and shopping cart

By clicking 'add to cart', either on the variable page or within the search environment, you can add a variable to your shopping cart. You can also select multiple variables within the search environment, and then click on the green 'add to cart' icon in the top right:

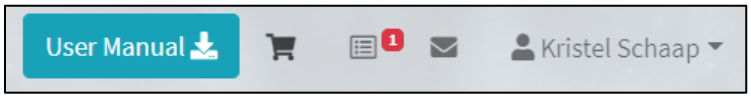
You can see which variables are currently in your shopping cart by clicking the 'cart' icon in the top row and go to 'Harmonization' to see the items listed (NB. *Sometimes the numbers behind 'Individual' and 'Harmonization' are not actively updated and might show '0', while actually items are placed in the shopping cart*):



The variables in your shopping cart can be downloaded as a zip file, by clicking the 'Export' button on the shopping cart page. The zip file contains multiple csv files.



When you are logged in to Mica, you can add the items in your shopping cart to lists that can be stored for later re-use or export. Creating and saving multiple lists is possible. Your lists can be found next to your cart on the top right.



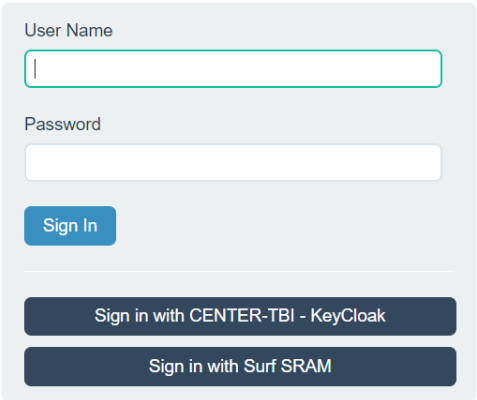
Attach the original, unchanged zip file to your data access request, to clarify the variables that you would like to request. For further information about data access requests, see **(https://www.center-tbi.eu/data)**.

9. Opal

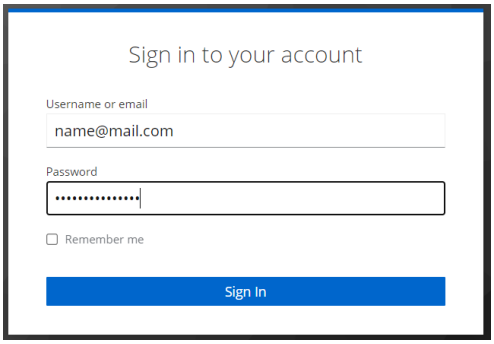
Opal is the core data warehouse application of OBiBa software stacks that provides all the necessary tools to import, validate, derive, query, report, analyze and export data. Because of its integration with R, complex statistical analysis and reports can be performed within Opal as well.
Further user guides of Opal are available here.

9.1 Log in

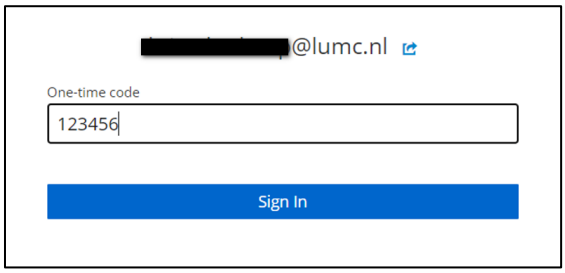
You can find the CENTER-TBI Opal data warehouse here.
Log in to Opal with your CENTER-TBI account and KeyCloak
First click on 'Sign in with CENTER-TBI – KeyCloak



Next, sign in with your CENTER-TBI username and password.

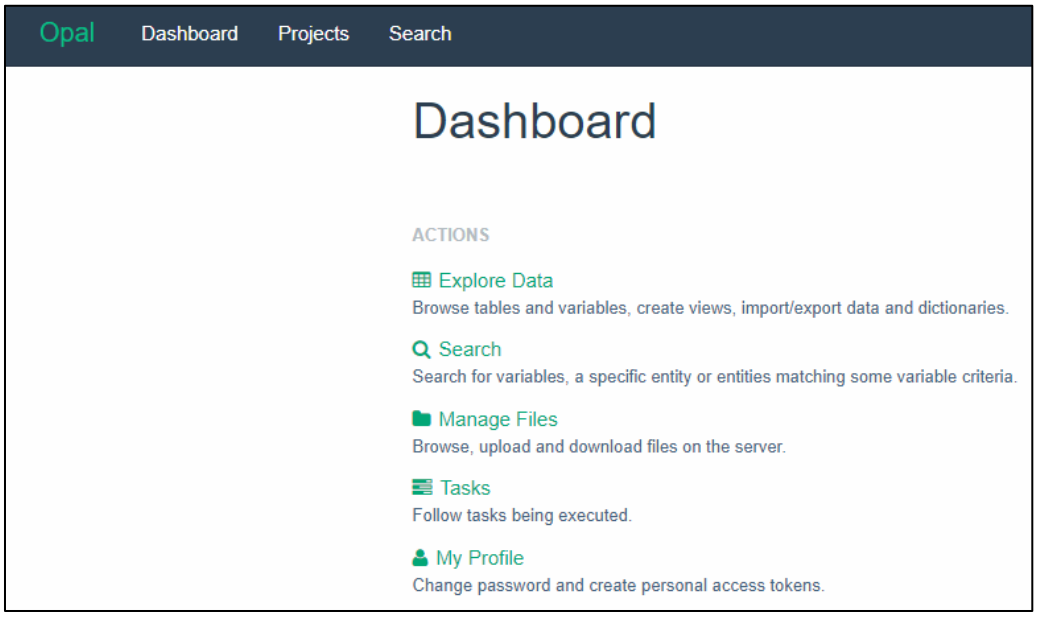


Next, fill in the one-time code from your authenticator app.



9.2 The Opal environment

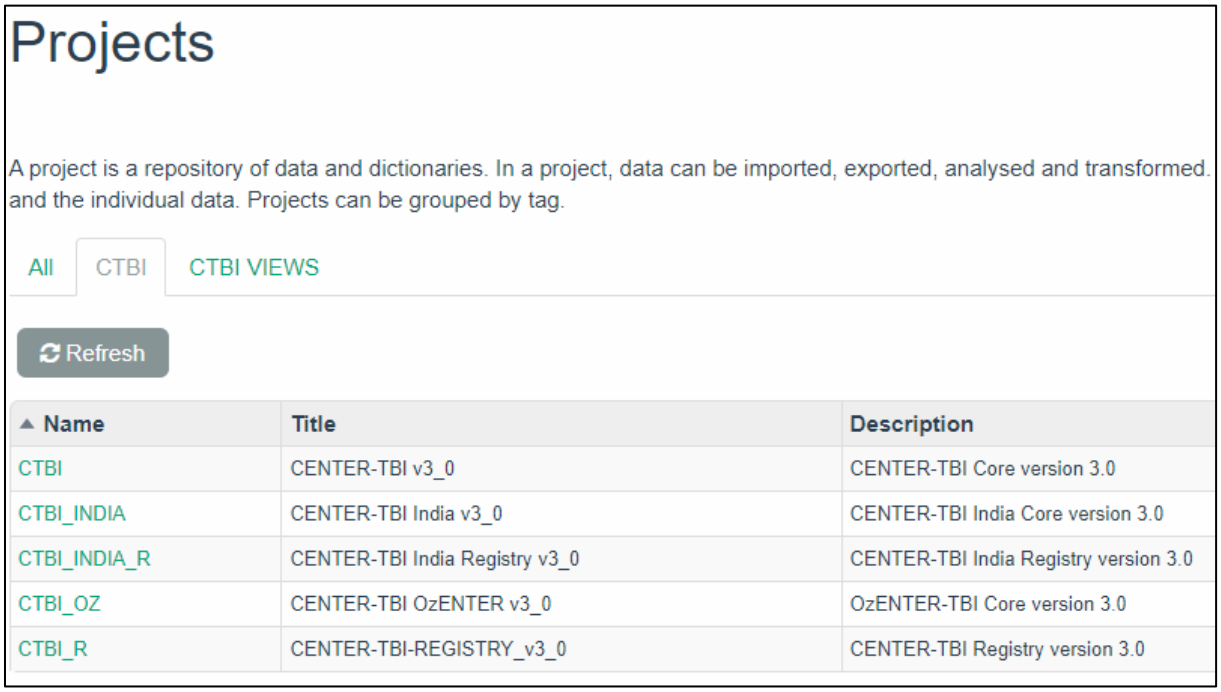
Upon opening Opal, you start on the dashboard page. From the dashboard you can navigate to your datasets, search specific tables or variables, and manage files within the Opal environment.



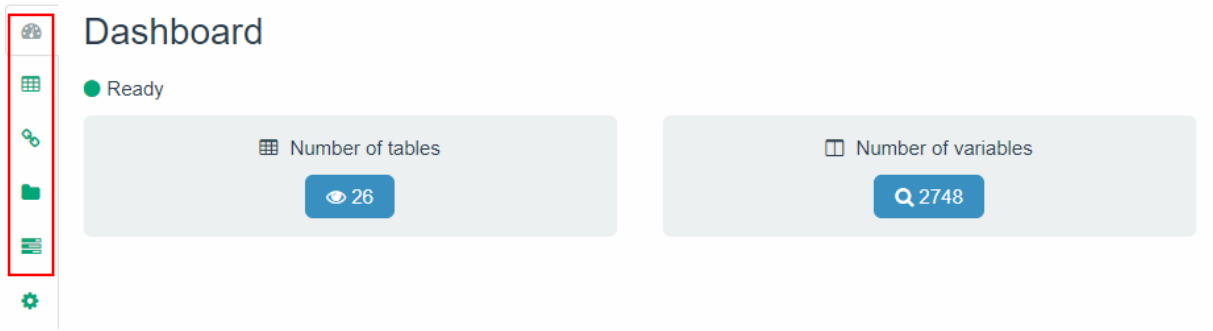
9.2.1 Exploring data

To get to the data, you can go to 'Explore Data', or click on 'Projects' in the top bar. This will guide you to the project section, where you can find the different datasets: CENTER-TBI Core, CENTER-TBI Registry, CINTER-TBI India Core, CINTER-TBI India Registry and OzENTER-TBI, or the views that have

been made for your project. The different versions of the datasets will also be visible here when appropriate.

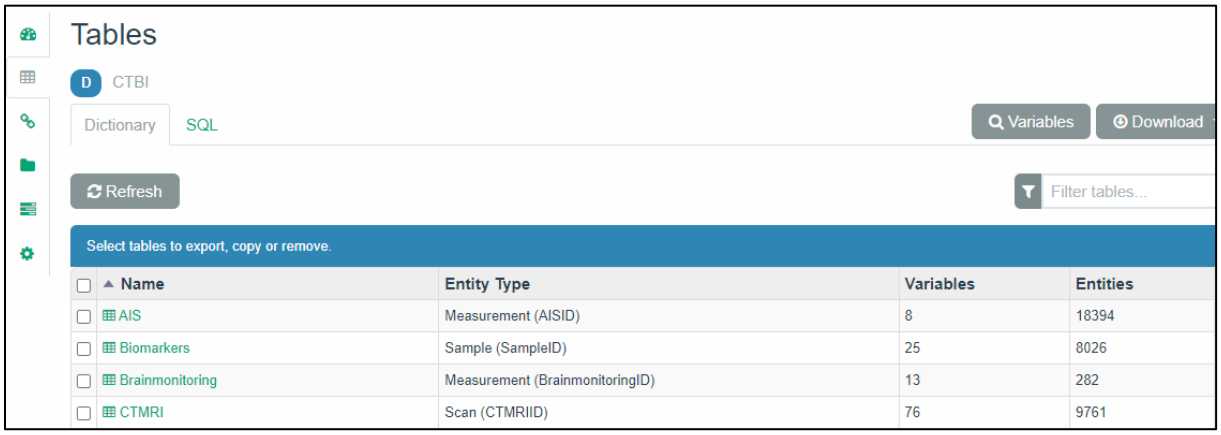


Clicking one of the projects will take you to the project Dashboard. The project dashboard gives an overview of the number of tables and variables that are available within the project.



Using the symbols on the left side, you can navigate to different sections.

The table symbol directs you to the tables section within the project.

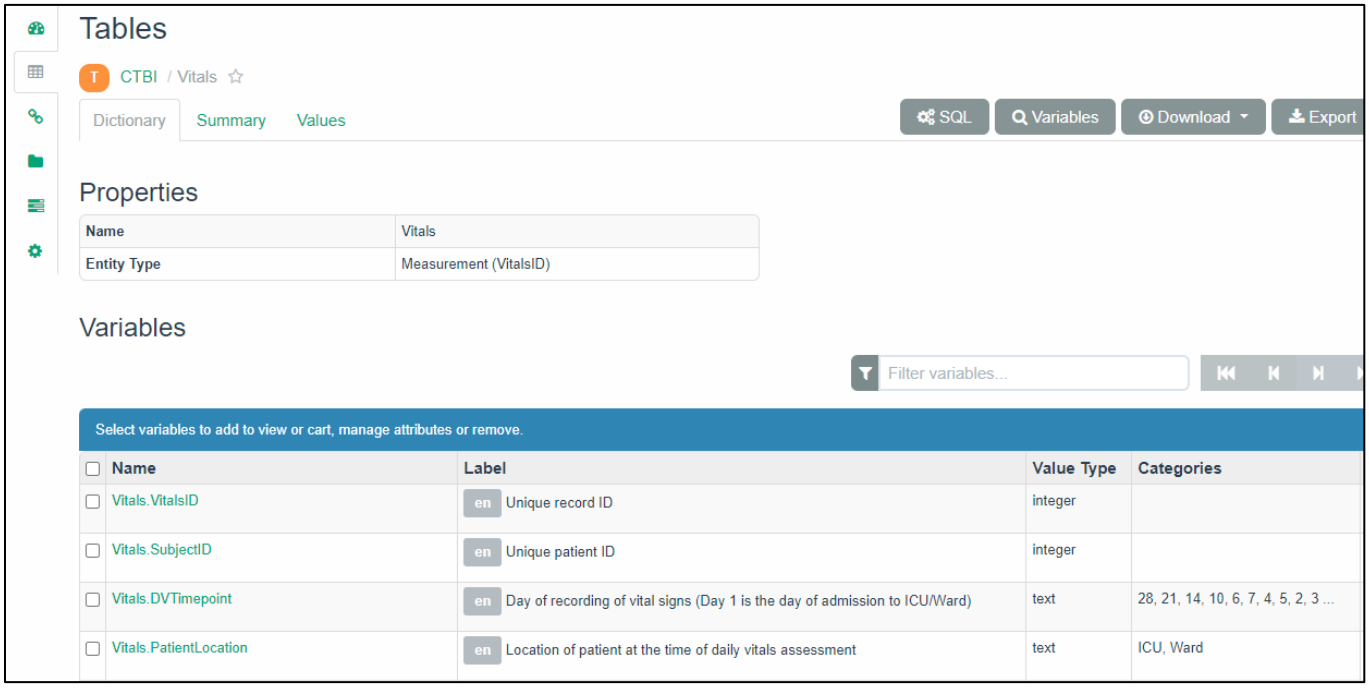


The overview also shows the number of variables and entities, which corresponds with the number of unique ID's. The column 'Entity Type' gives some insight into the nature of the ID's.

In the tables section you can click on the tables to navigate to a table. You can also select tables for export, or write SQL statements to make subsets of the data. More on how to use these options can be found in the export section of this manual.

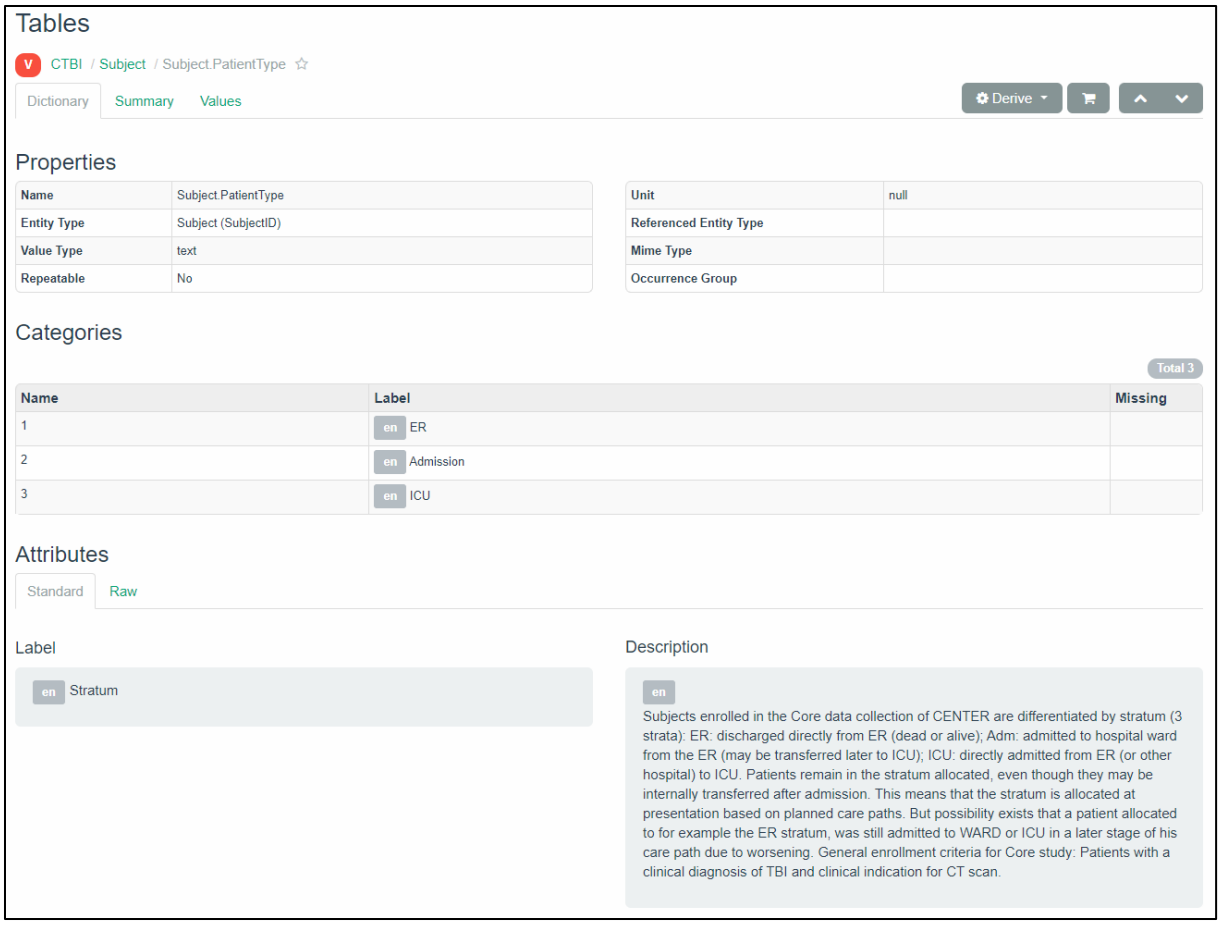
After clicking on a table, you will see an overview of all the variables in the table.

Table 'Vitals' (in the study 'CTBI'):

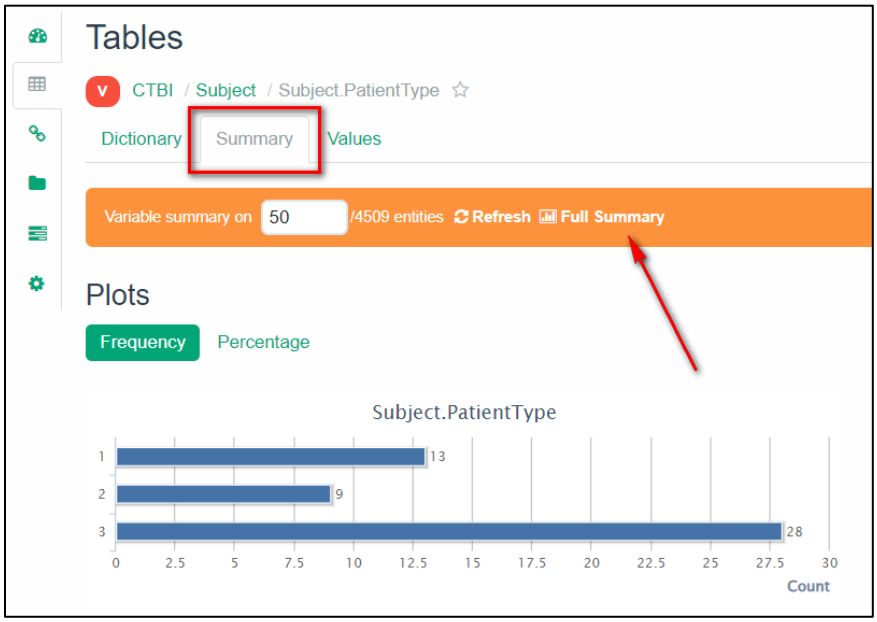


Here you can click on a variable to see more details, or select variables for creating views.

Variable 'Subject.PatientType' (in the table 'Subject', in the study 'CTBI'):

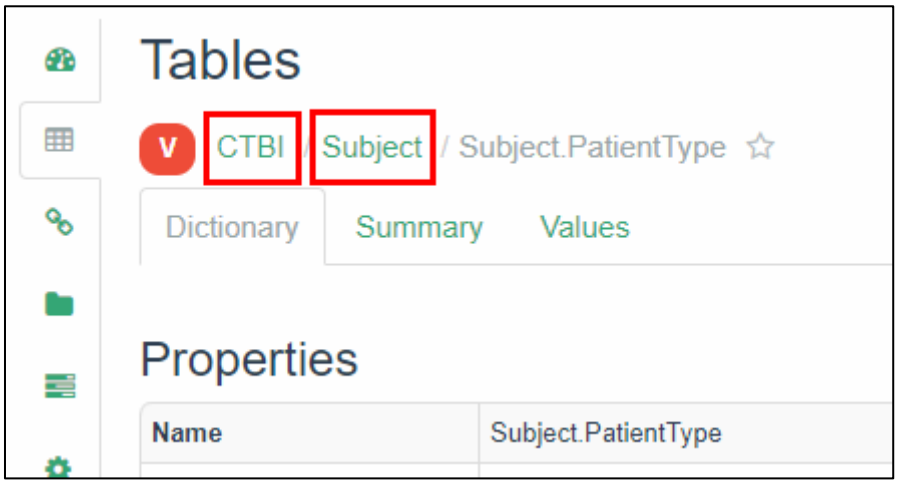


The 'Summary' tab gives an overview of the basis data descriptives, such as frequency tables. !Note that by default Mica only shows the summary data based on the first 50 records. Click on 'Full Summary' to see the summary of all records.



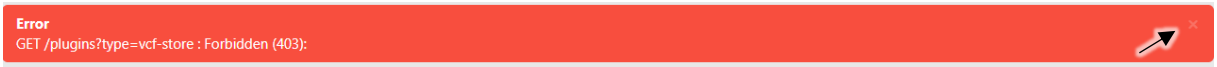
The 'Values' tab shows you a table of the data values for this specific variable.

When you are looking at a specific variable, and you want to go back to the table view, click on the table name, *e.g.* "Subject". You can also use the "back" option in the browser. When you want to go back to the list of all the tables in the Project, you can click on "CTBI" in this example:



The file symbol directs you to the files system, where you can find your downloaded files and extract them to your computer.

The cogwheel is the project administration symbol, and should not be clicked on. Clicking on it will result in a persistent error message pop-up. If you accidentally click on it, the error message can only be removed by clicking on the x in the red error bar:

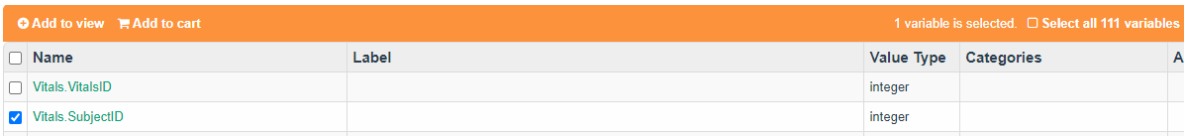


9.2.2 Creating a view

A view in Opal refers to a specific selection of variables. **These variables have to come from one table.** Creating views can be very useful if you need a few variables for a specific analysis and don't need the full data tables. You do however need specific rights to be able to create views in an Opal project. For CENTER-TBI, each user has a separate personal Opal project titled "username ctbi views", where researchers can store and access their views.

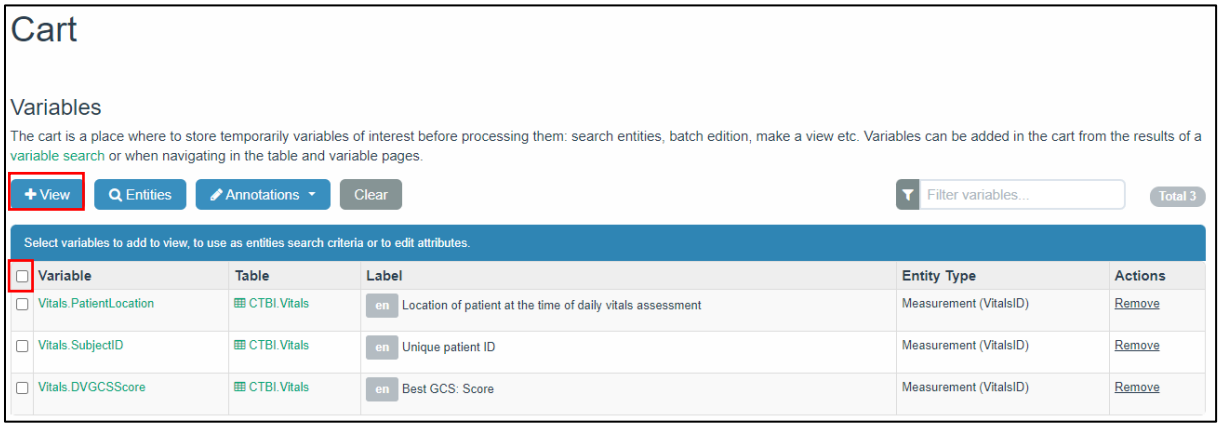
If you have requested data via the CENTER-TBI online Data Access request form and attached your variable selection from Mica, we will create a view for you. In that case, you will not be able to make your own views (valid for external researchers).

If you are part of the CENTER-TBI collaboration and have access to the full dataset, you will be able to make views yourself. If you want to make a view from a selection of variables in a table, you can select the variables you need using the checkboxes. When you select variables, a yellow bar will appear giving you two options: 'Add to view' and 'Add to cart'. You can choose 'Add to view' and create a view right away.

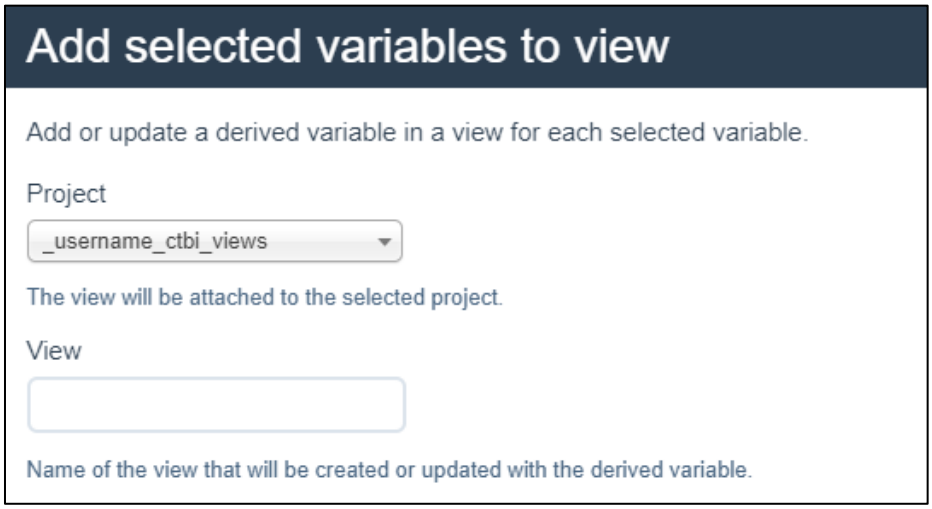


If you want to inspect the variables during selection, you can choose the option 'Add to cart'. This will place the variables in the cart and allow you to go look at specific variables or other things before you add more variables. The cart is visible in the top bar of the page, and shows the amount of variables currently in it.

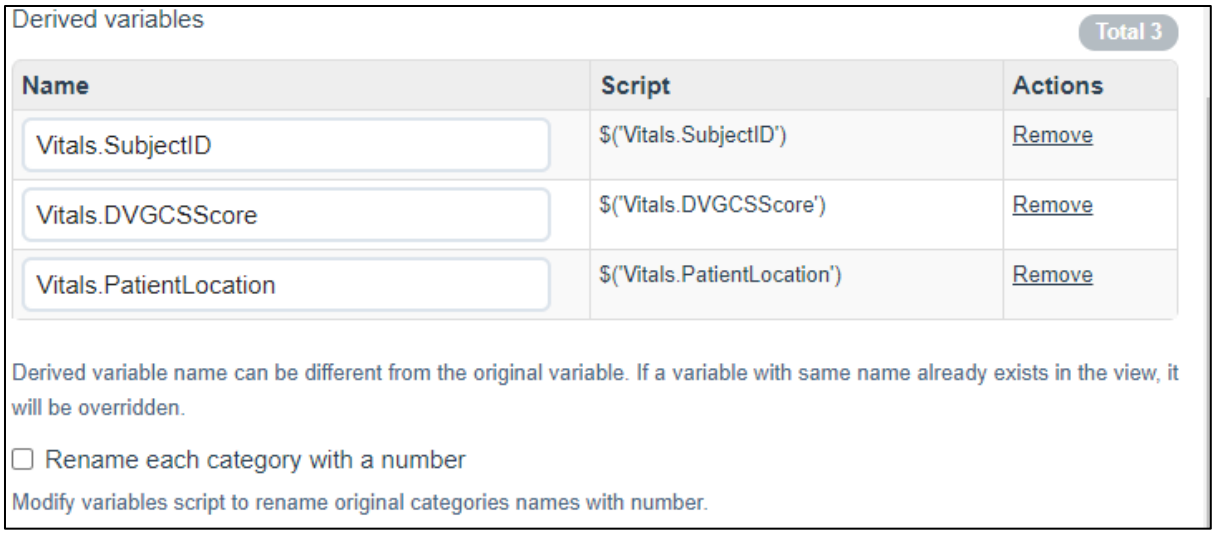
When you click on the cart, it will show all variables you have placed in it so far. From here, you can select all the variables in the cart and click on the '+View' button to create a view.



When you create a view, you get a pop-up asking you to provide the necessary details. You have to select the project to which you want to add your view, and create a name for the view. **Your views should always be saved in your personal ctbi views project.** This is the only project where it is possible for you to add views.



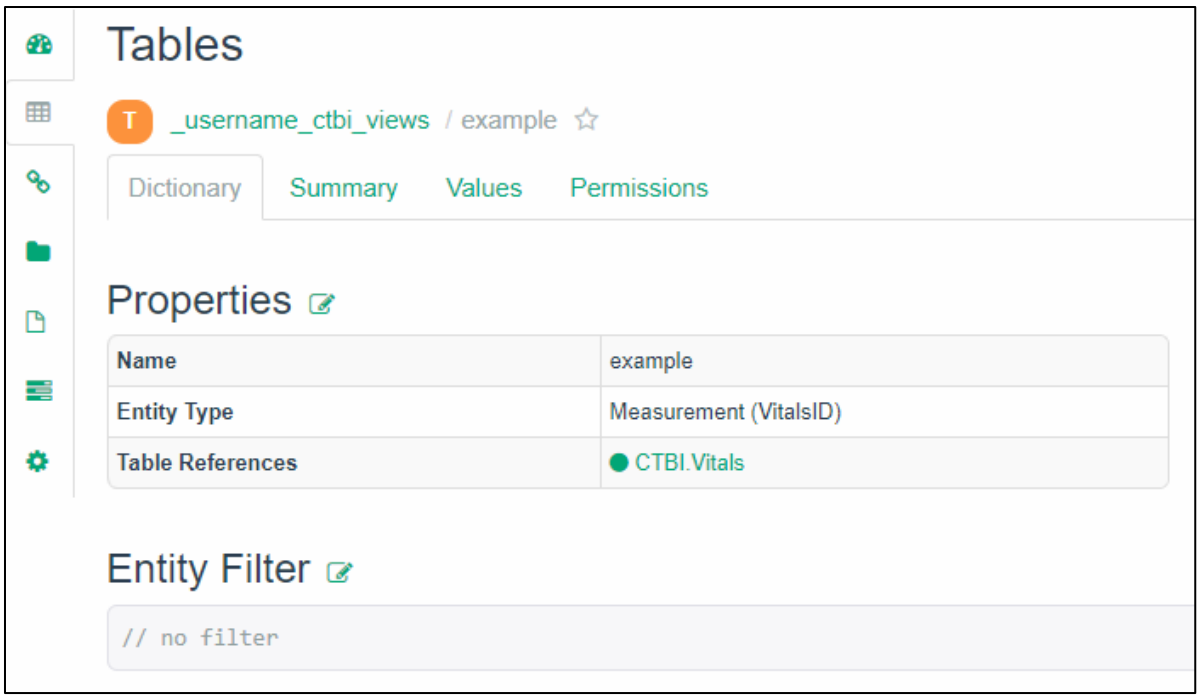
The pop-up will also provide you with a couple of options. You can rename variables to names for your view, and select the option to rename text-based categorical variables to numerical values.



Once you have created your view, you can find it in your personal ctbi views project.

9.2.3 Population filters in views

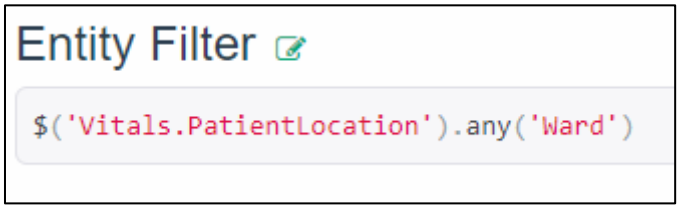
You now know how to make a view out of a selection of variables. But what if you want to filter your view for a specific population. In general, it is easiest to do this within R, or another statistical software, if you just want to do this for your own analysis. However, if you want to make simple selections in Opal, this is possible by using an **entity filter**. Within your view, you will find a section that says 'Entity Filter'. This section is automatically set to 'no filter'.



Beware that you can only apply a population filter based on (one of the) variables in your view. The entity filter makes use of a programming language called 'Magma Javascript'. You can apply simple filters based in the following way:

```
$('variable name').any('value')
```

The $ sign specifies that something is a variable, and the .any() command will filter all cases for which your statement is true. You have to insert the name of the variable you want to use as a filter, and then the value that you want to filter on. For instance, if you have a view with variables from the Vitals table, and you want your view to only have patients from the ward, you would do that as follows:



The .any() statement can hold multiple values, so you can add multiple values of the variable. For instance, you can expand the previous selection on patient location to include the ICU as follows:

Be aware that an entity filter filters per entity (unique ID). When there is repeated data, if one of the repeats contains the value you are filtering for, all records with that ID will be included in the view.

9.3 Exporting your data

There are two ways of accessing the data in Opal for data analysis. The recommended method is to load data into R through a direct connection with Opal. You can run your analyses in R, without having to store the data outside Opal. In this way, the data don't leave the server and this prevents many copies of the data roaming around. Alternatively, exporting the data to data files for use within other programs is also possible.

9.3.1 Loading data into R

To analyze the data, you can load tables and views into R. R is widely used free statistical software that is available for Windows, MacOS and UNIX platforms. For more information on R, or to download the software, you can go to https://www.r-project.org/. It is recommended to also use the Rstudio software, which provides a more user-friendly graphical interface. Rstudio can be downloaded here.

For loading data from Opal into R, you need the 'opalr' package. To install and use this package, you can run the following commands in R:

```
install.packages('opalr')
library(opalr)
```

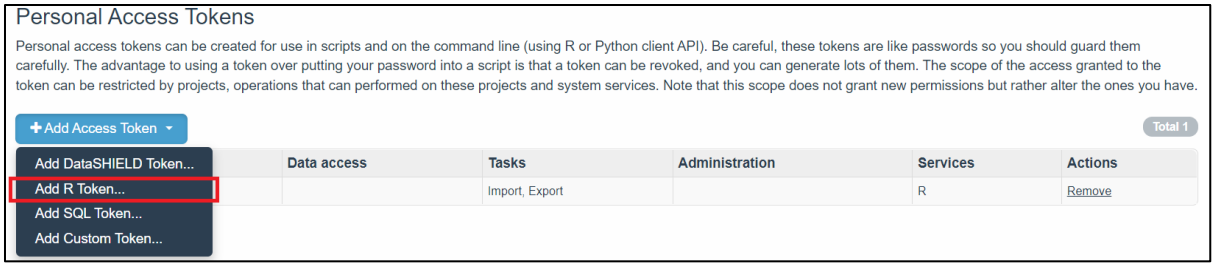
You use a personal Opal token to make a connection to the Opal database. Never type your token directly in your R scripts, since scripts might be shared with other people or stored on shared spaces.It is strongly recommended to save your token in a password manager, instead of directly in your scripts.

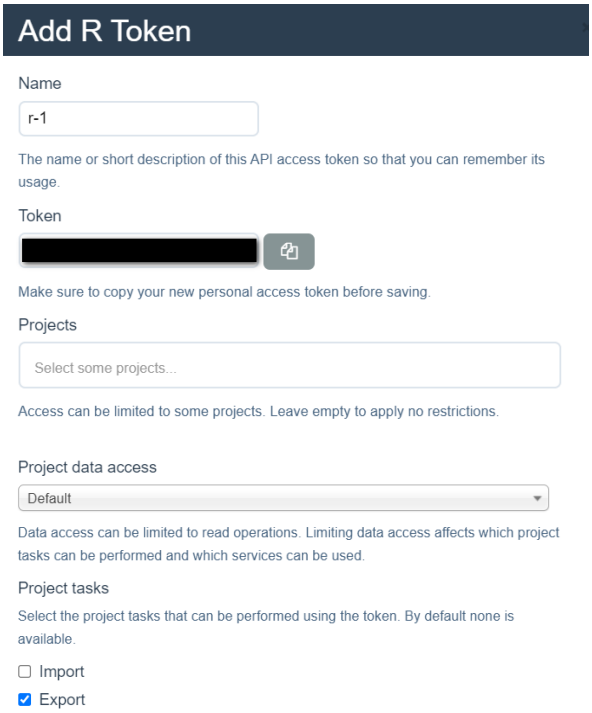
The 'keyring' R package is recommended as a good way to safely store your token(s) in the password vault on your pc.

Store your Opal token with the keyring package (this needs to be done only once):

1. Navigate to Opal and login. Click on My Profile by clicking on your username

2. Click on the **Add Access Token** button followed by **Add R token**.
    a. A standard name is provided for your token. If you wish, you can change the name.
    b. Remember the token name you've entered and copy the token that has been created. Please note that the token will appear only once!
    c. Leave 'Projects' empty to get access with this token to all your Opal projects. If you wish to work with only one or two projects, you can select the names of those projects.
    d. At 'Project tasks', make sure that 'export' is selected.





3. Open R
4. Make sure you've installed the 'keyring' package in R:

```
install.packages('keyring')
library(keyring)
```

5. Set keyring by the following script: *keyring::key_set("name of your token").* You can give any name you wish to the key, but it would make sense to choose the same name as given to the R token in step 2. A pop-up will appear. Paste the token that has been created in step 2. You will not see a confirmation, but you can check whether the key has been stored correctly by typing: *keyring::key_get("name of your token").*
6. The keyring will be saved in the Windows Credential Store (or other system safe store) of your device.

Use the keyring to access Opal

To make a connection to the Opal database, run the following code in R:

```
opal_connection  <- opal.login(token = keyring::key_get("name of your
token"), url ='https://opal.center-tbi.eu/repo')
```

For loading your data into R, you can use the opal.table_get command as shown below, where you need to insert the name of your project and view or table in the appropriate place. After loading the data, it is ready to be used for data analysis within R.

```
data_table1 <- opal.table_get(opal = opal_connection, project =
'insert name of project' , table = 'insert view or table name')
```

e.g.

```
data_table1 <- opal.table_get(opal = opal_connection, project = 'CTBI'
, table = 'Surgeries')
```

9.3.2 Exporting to a data file

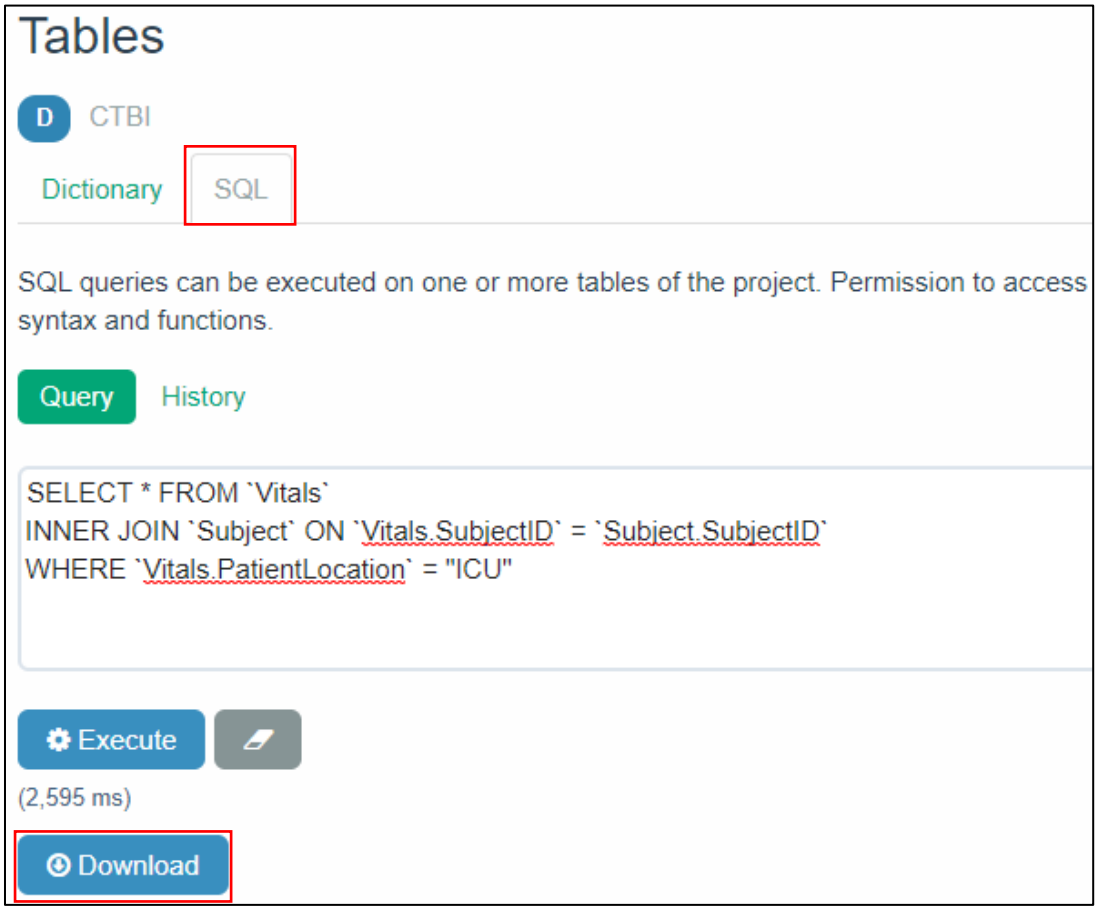
If you prefer not to work with R, it is also possible to export data of your view from Opal into various formats, like CSV or SAV (SPSS). To do this, you have to navigate to the view, and then click on the export button. A window will pop up where you can specify the data format.

The export will be placed in your personal export folder within Opal, found in the files section. From there, you can download it to your personal computer. The file will stay available in your export folder for later use, until you delete it.

9.3.3 SQL selections

When making manual exports, it is also possible to use SQL statements to make selections in variables and records, commonly known as queries. In the 'SQL' tab, users can use standard SQL commands like

SELECT, FROM and WHERE to make selections for the specific use-case. It is important to use backticks (`) around the names of table and variables within these query statements. The selection can be downloaded using the download button below the query. Creating joins between tables is also possible. **Beware** that this should only be used if the user has experience with SQL, as it is easy to make mistakes leading to incorrect datasets.



10. Useful Links

CENTER-TBI website: https://www.center-tbi.eu/

Issue tracking system (helpdesk): https://support.center-tbi.eu/

Data Dictionary: https://datadictionary.center-tbi.eu/

GitLab Repository: https://git.center-tbi.eu

Data access & publication requests https://www.center-tbi.eu/data

Cantab manual: https://www.center-tbi.eu/manual/CANTAB-RS6-v20140728

Annex 1: Imaging data

By searching the domains 'CTMRI' or 'Imaging' you can access all the imaging related variables. If you would like to search and export the imaging variables that contain links to the actual images it can be searched by 'imaging url' and exported.

We recommend using the "**Imaging.**" domain primarily, since that domain combines all data from CTMRI and FollowUp together with the imaging Meta data.

The "Imaging.CRF…" variables combine imaging data extracted from the e-CRF.

e.g. Imaging.CRFTimepoint = CTMRI.Timepoint + FollowUp.Timepoint.

Central Structured and Standardized Reporting was performed using the NINDS CDEs on all interpretable CT images. By searching "StructuredReporting" you can access this data.

An R code has been developed to help you extract into comprehensive tables the detailed structured reporting information from the Imaging.LesionData variable (JSON files). The code is available in the CENTER-TBI Gitlab. You will also find an interactive diagram of the 25 CDEs and their possible attributes on the CENTER-TBI Gitlab.

CT early is considered "**first CT**". When a Central review is not available this can be due to:

- Scan uninterpretable (wrong scans, bad quality, etc.)
- Scan not available/performed/uploaded

  Reasons for scan not being available included:

  - Scan performed in referring hospital and images not available
  - Pediatric patient and MR performed instead of CT (reducing radiation risk)
  - Patient too uncooperative to undergo scan, and no indication for sedation.

In order to obtain the reports for the initial CT scan, follow the next steps:

1) in Opal download Subject.Gupi, Imaging.ExperimentId, Imaging.Timepoint and your variables of interest;

2) select for unique values of Imaging.ExperimentId;

3) select for timepoint = CT early;

4) you should get 4221 CT early reports of which 4088 were interpretable and interpreted

Note: a new platform for the imaging files is currently under development by Icometrix. From here, imaging data will be available through a federated approach.

To measure the reproducibility of imaging data, in particular DTI data with the aim to enhance standardized analyses, both **phantom** and **healthy volunteer** data were collected in a selected number of sites.

Here are the links:

ImagingPhantoms

ImagingControls

For the following list of experiment IDs, Nifti scans are not available. This can be due to the uninterpretability, Dicom missing, preprocessing failed, too few slices, slice increment inconsistency, spine scans uploaded, etc..

CTBI_E00720
CTBI_E00750
CTBI_E00806
CTBI_E01185
CTBI_E01568
CTBI_E02498
CTBI_E02714
CTBI_E04472
CTBI_E06282
CTBI_E06314
CTBI_E06316
CTBI_E06338
CTBI_E06358
CTBI_E07598
CTBI_E08970
CTBI_E10511
CTBI_E10515
CTBI_E10517
CTBI_E13350
CTBI_E13751
CTBI_E14440
CTBI_E15031
CTBI_E18183
CTBI_E18185
CTBI_E19049
CTBI_E19985
CTBI_E20029
CTBI_E20033
CTBI_E20035
CTBI_E20043
CTBI_E20497
CTBI_E21936
CTBI_E25935
CTBI_E27070
CTBI_E28374
CTBI_E29423
CTBI_E30197
CTBI_E32561
CTBI_E32569
CTBI_E41403
CTBI_E43223
CTBI_E43227
CTBI_E43231
CTBI_E43235
CTBI_E43239
CTBI_E43243
CTBI_E43247
CTBI_E43251
CTBI_E43255
CTBI_E43259
CTBI_E43263
CTBI_E43267
CTBI_E43271
CTBI_E43275
CTBI_E43279
CTBI_E43283
CTBI_E43287
CTBI_E43291
CTBI_E43295
CTBI_E43299
CTBI_E43303
CTBI_E43307
CTBI_E43311
CTBI_E43315
CTBI_E43319
CTBI_E43323
CTBI_E43327
CTBI_E43331
CTBI_E43335
CTBI_E43339
CTBI_E43343
CTBI_E43347
CTBI_E44845
CTBI_E45724
CTBI_E47528
CTBI_E54085
CTBI_E54687
CTBI_E56454
CTBI_E65876
CTBI_E65993
CTBI_E66128
CTBI_E66364
CTBI_E66384

For the following list of GUPI's there is no imaging data available because no images have been uploaded to the central repository:

2aKg329	3Mxj242	5hqa779	7CGC395	8rWe275
2aZc954	3nxp645	5hSR652	7DkP965	8swy254
2CwE756	3QtP966	5iBD359	7dKx492	8Tvi853
2CYR995	3rqp487	5iLF374	7dMi577	8xyJ537
2DLL573	3rth894	5JHf259	7FEV334	8Ypg329
2EeT899	3tPx998	5kgp479	7fzL326	8YQm799
2enN423	3Vzc963	5kGq874	7GjL839	9bkT239
2FXu462	3xYA486	5kxA247	7hBd367	9bPn863
2GBu796	3zCu247	5LXx254	7hQS673	9BQE783
2GEY763	4aiT765	5QpW899	7keL575	9ceB526
2gSm989	4arN655	5qyM254	7Ndj855	9frd568
2Hqs463	4cNx999	5uEp795	7ryW383	9gzj428
2LSz237	4CRz375	5xfa852	7TAg459	9hYZ524
2nEF378	4FmV422	5Xrg353	7TFQ763	9Khz638
2Njt548	4fVB478	5yeX796	7tjT299	9LSS688
2pjV364	4GiQ982	5zEy356	7Uig748	9NAk452
2qbz679	4hJR542	6Amc624	7UiY495	9qCk363
2Qjc754	4hWG766	6AQD757	7uXt263	9qsP965
2rCM426	4JAW268	6bJy778	7VDS928	9QwR739
2SiV997	4Jbh597	6CSJ667	7vzi267	9SzG278
2tYg498	4mrf549	6eVk586	7Xrc556	9TAP374
2UFb788	4pUb945	6ezY353	7yAV286	9tfK563
2uKc322	4qeX427	6HuM739	7ydN775	9thB794
2VdG646	4Qzq727	6itq446	7YeE448	9umj552
2xPq786	4rde674	6iYc665	7Zmp573	9UUC848
2yuc942	4RST279	6KNy732	7ZqT564	9UYd464
2ZFf733	4SnU954	6RLt465	8ahU997	9VdG934
2zUX287	4vnx935	6sqR823	8aYp777	9Wcr656
2Zzf943	5bDR966	6teA862	8bcT775	9WXx422
3bwd673	5btz622	6VmM865	8cdZ428	9xNa427
3Cen349	5BwA829	6Xtv852	8cZU858	9XtN928
3dsY975	5DPs832	6yeM346	8dAj689	9yPZ753
3dyu657	5Dzy536	6Yvw547	8fgS499	9zQx843
3gAJ693	5fWB355	6ywi954	8iga477	
3HCR796	5GXU253	6ZQE735	8kCf765	
3iUs972	5hDc979	6ZTC457	8PTs464	
3MiC879	5hPD942	7AcU632	8qdZ537	

Annex 2: High Resolution ICU data

By searching the domain 'Brainmonitoring', you can access all the High resolution ICU related variables. If you would like to search and export the variable that contains links to the HDF5 files, it can be searched by 'brainmonitoring url' and then exported.

Note: In order to access and download the HDF5 files you need specific access rights. Please contact https://support.center-tbi.eu/ for access permission.

Annex 3: Outcome data: GOSE scoring

There are four main sources for GOSE ratings in CENTER-TBI, summarized as follows:

(1) Clinician overall GOSE rating (*Outcomes.GOSEScore)*. Structured interviews for the GOSE were conducted face to face or by telephone with either the patient or another informant. Interviewers then assigned an overall rating. Occasionally a clinician rating may have been recorded without an interview, if contact was not possible, and there was sufficient information from other sources.

(2) Centrally assigned GOSE based on structured interview responses. Completed GOSE questionnaires were assigned a rating centrally on the basis of the responses recorded, as described above.

(3) GOSE self-report questionnaire scored centrally as already described. Questionnaires could be completed by patients alone, by patients with the help of carers, or by relatives / carers alone.

(4) Deaths assigned using date of death in the database. Central scoring added the outcome rating 'dead' to the composite GOSE variables when appropriate. 'Dead' is assigned if (a) the date of death occurs before the follow-up window for the timepoint has closed, (b) no other outcome has been assigned to the composite (from interview or self-report sources), (c) A follow-up is due at the timepoint per protocol.

Approaches to GOSE assessment used in CENTER-TBI were sufficiently well aligned to justify construction of composite and derived variables for use in subsequent analyses.

In Mica/Opal you will find the following available GOSE variables:

Outcomes.GOSEScore:

This GOSE Structured rating was assigned by the rater/interviewer at the time of the interview and entered in the e-CRF for a particular follow-up time-point, along with responses on the sections of the interview.

Outcomes.DerivedCompositeGOSE:

This GOSE rating is a derived composite score calculated from sources in the following order of precedence:.

(a) Central scoring based on GOSE interview questionnaires completed by investigators

(b) Central scoring based on GOSE self-report questionnaires completed by patients and/or carers

(c) Interviewer ratings for survivors, when neither the interview or self-report questionnaires have been completed

(d) From date of death or investigator recorded death

Subject.GOSE6monthEndpointDerived:

A six month GOSE endpoint that uses both observed ratings (i.e. *Outcomes.DerivedCompositeGOSE)* and imputed values (when the observed value was missing or outside the pre-specified time window (5-8 months))

Subject.DerivedImputed180DaysGOSE:

This variable contains a GOSE that has been imputed at exactly 180 days after injury. In this variable the observed values also were replaced by imputed values.

We recommend using **Subject.GOSE6monthEndpointDerived** for analyses. This variable conforms to conventional expectations that imputation is only used when observed values are not available.

For predictive modelling, the imputed variable **Subject.DerivedImputed180DaysGOSE** might be preferred. This variable takes advantage of smoothing accomplished by the imputation process, and avoids using a hybrid of observed and imputed values.

These variables have very similar values and the choice of which to use will have little in the way of practical implications.

A MSM model has been used for imputation in both variables
(see also https://www.liebertpub.com/doi/10.1089/neu.2019.6858).

Outcomes.GOSEScore and *Outcomes.DerivedCompositeGOSE* contain a higher number of missing values and are not being recommended for general-purpose use in subsequent analyses.

The GOSE was collected at 3 months and 6 months across all strata, and at 12 months in the admission and ICU strata. Depending on the strata and on the MRI sub-study the GOSE may have been collected in other subgroups at particular timepoints. The same rules and models have been applied for 3 month and 12 month outcome, leading to the following variables available in Mica/Opal:

Subject.GOSE3monthEndpointDerived

Subject.DerivedImputed90DaysGOSE

Subject.GOSE12monthEndpointDerived

Subject.DerivedImputed360DaysGOSE

GOSE scoring OzENTER (Australia) dataset:

GOSE was measured by either a postal questionnaire or a structured telephone interview by a trained assessor.

Subject.GOSE6monthEndpointDerived: does not include imputed values in the OzENTER data set. It equals the composite GOSE at 6 months.

GOSE scoring CINTER India dataset:

Outcomes.GOSEScore

For the 3 and 6 month GOSE scoring, the Indian investigators did not perform a structured interview (as was done in CENTER-TBI), since this was too time consuming for many patients. The investigator asked some general questions about quality of life and how the patient felt and then completed the GOSE questionnaire in the e-CRF based on their clinical judgement. Hence, the "Outcomes.GOSEScore" variable is a guided interview, in line with the original GOS approach, in which the clinician has a description of different GOS categories and, based on the information available, makes a judgement about the overall rating.

Outcomes.DerivedCompositeGOSE / Subject.GOSE6monthEndpointDerived:

Data entered in the Postal GOSE, is a copy of the interview GOSE – no postal questionnaires were performed.

As questionnaires were only interview based, no composite or derived variable is available for the Indian dataset, the variable "Outcomes.GOSEScore" should be used.

Annex 4: Outcome data: Cantab

Researchers who wish to understand the way that the CANTAB tests are administered and the outcomes are derived, should refer to the CANTAB Eclipse Test Administration Guide that is available through this link: https://www.center-tbi.eu/manual/CANTAB-RS6-v20140728

The guide to modes and outcome measures that gives the key to the specific CENTER-TBI outcomes as recommended by Cambridge Cognition can be found below.

There is some redundancy among these outcomes and researchers may want to be selective in their final choice of variables.

The main (confounding) covariates for these tests are age and education level, and particularly the former. These need considered in analyses.

The CANTAB outcomes can be skewed and/or have outliers, and depending on your analysis you may want to transform (e.g. Log10) and/or truncate variables or otherwise deal with these problems.

CANTAB: Guide to Modes and Outcome Measures for CENTER-TBI study

Cambridge Cognition. February 2016
Research - Cantab Research Suite

Attention Switching Task (AST)

Designed to assess: executive function that provides a measure of cued attentional set-shifting (cognitive flexibility)

Mode: *8d1-8d2-40d2a-8s-40sa-8s8d-40s40da*

Block	Number of Trials	Rule?	Practice or Assessed?	Feedback
1	8	Direction	Practice	Yes
2	8	Direction	Practice	Yes
3	40	Direction	Assessed	No
4	8	Side	Practice	Yes
5	40	Side	Assessed	No
6	16	Direction and Side	Practice	Yes
7	80	Direction and Side	Assessed	No

Duration: ~8 minutes

Key Outcome Measures	Definition
Median Switching cost	The difference between the median latency of response (from stimulus appearance to button press) during assessed blocks in which the rule is switching versus assessed blocks in which the rule remains constant. Calculated by subtracting the median latency of response during non-switching block(s) from the median latency of response during switching block(s). This measure is complex in sense. Close to zero indicates less variation in latencies across non-switch and switch trials. A positive score indicates that the subject responds more quickly in non-switching block(s).

Median Congruency cost	**The difference between the median latency of response (from stimulus appearance to button press) on the trials that were congruent versus the trials that were incongruent. Calculated by subtracting the median congruent latency (in ms) from the median incongruent latency. This measure is complex in sense. Close to zero indicates less variation in latencies across congruent and incongruent trials. A positive score indicates that the subject is faster on congruent trials and a negative score indicates that the subject is faster on incongruent trials.**
Median Reaction Latency	The median latency of response (from stimulus appearance to button press), calculated across all correct, assessed trials

Paired Associates Learning (PAL)

Designed to assess: episodic memory and visuospatial learning

Mode: *Clinical*

Stage	Number of Patterns	Number of Boxes	Practice or Assessed	Max Number of Attempts
1, 2	1	6	Assessed	10
3, 4	2	6	Assessed	10
5, 6	3	6	Assessed	10
7	6	6	Assessed	10
8	8	8	Assessed	10

Duration: ~10 minutes

Key Outcome Measures	Definition
Total errors (adjusted)	The number of times the subject chose the incorrect box for a stimulus on assessment problems but with an adjustment for the estimated number of errors they would have made on any problems, attempts & recalls they did not reach due to failing or aborting the test
First trial memory score	The number of correct box choices that were made on the first attempt during assessment problems.
Stages completed	The number of stages that the subject passed.

Reaction Time (RTI)

Designed to assess: reaction time, movement time and vigilance

Mode: *RTI TBI*

Stage	1 or 5 choice?	Practice or Assessed	Number of Trials	Max Trials Allowed
1 *(identical to stage 2 in Clinical mode)*	5-choice Touchscreen	Practice	12 trials (stage repeated if less than 5 out of 12 correct)	40
2 *(identical to stage 5 in Clinical mode)*	5-choice Press-pad	Assessed	8 trials (stage repeated if less than 5 out of 8 correct)	40

Duration: ~X minutes

Mode: *Clinical*

Stage	1 or 5 choice?	Practice or Assessed	Number of Trials	Max Trials Allowed
1	Simple Touchscreen	Practice	9 (stage repeated if less than 5 out of 9 correct)	18
2	5-choice Touchscreen	Practice	12 (stage repeated if less than 5 out of 12 correct)	40
3	Simple Press-pad	Practice	9 (stage repeated if less than 5 out of 9 correct)	18
4	Simple Press-pad	Assessed	9 (stage repeated if less than 5 out of 9 correct)	18
5	5-choice Press-pad	Assessed	8 (stage repeated if less than 5 out of 8 correct)	40

Duration: ~6 minutes

Key Outcome Measures	Definition
Median 5-choice reaction time	The median duration between the onset of the stimulus and the time at which the subject released the button. Calculated for correct, assessed trials in which the stimulus could appear in any one of five locations
Median 5-choice movement time	The median time taken to touch the stimulus after the button has been released. Calculated for correct, assessed trials where stimuli could appear in any one of five locations

Rapid Visual Information Processing (RVP)

Designed to assess: sustained attention and concentration

Mode: *Clinical*

Stage	Target Sequence	Practice or Assessed
1	357	Practice
2	357	Practice
3	357	Practice
4	357; 246; 468	Practice
5	357; 246; 468	Assessed
6	357; 246; 468	Assessed
7	357; 246; 468	Assessed

Duration: ~7 minutes (1 minute per stage, 9 target sequences per minute)

Key Outcome Measures	Definition
A' prime	A' (A prime) is the signal detection measure of sensitivity to the target, regardless of response tendency (the expected range is 0.00 to 1.00; bad to good). In essence, this metric is a measure of how good the subject is at detecting target sequences
Median latency	The median response latency during assessment sequence blocks where the subject responded correctly

Stockings of Cambridge (SOC)

Designed to assess: spatial planning and spatial working memory

Mode: *Clinical*

Problem Number	Practice or Assessed?	Number of Trials	Min. number of Moves Required	'Too Many Moves'
1,2,3,4	Practice	4	1	3
5,6	Practice	2	2	5
7,8	Assessed	2	2	5
9,10	Assessed	2	3	7
11,12	Assessed	2	4	9
	Follow-phase	*The computer replicates the moves the subject made to complete the previous 8 problems, and the subject must simply follow the moves on screen*		
13,14	Practice	2	2	5
15,16	Assessed	2	4	9
17,18,19,20	Assessed	4	5	12
	Follow-phase	*The computer replicates the moves the subject made to complete the previous 8 problems, and the subject must simply follow the moves on screen*		

Duration: ~10 minutes

Mode: *Clinical-no follow*

Overall Stage	Practice or Assessed	Number of Trials	Number of Moves Required	'Too Many Moves'
1	Practice	4	1	n/a
-	Practice	2	2	n/a
2	Assessed	2	2	5
-	Assessed	2	3	7
-	Assessed	2	4	9
3	Practice	2	2	n/a
-	Assessed	2	4	9
-	Assessed	4	5	12

Duration: ~8 minutes

NB: use the Clinical mode if you want to look at thinking time as well as accuracy scores, whereas the Clinical-no follow mode should be used if you only want to look at accuracy scores and not latency scores

Key Outcome Measures	Definition
Problems solved in minimum moves	The number of times the subject has successfully completed a problem in the minimum possible number of moves
Initial thinking time ***(NB: Applicable to the Clinical mode only)***	The mean difference of the time taken to select the first ball in the solve problem phase and the time taken to select the first ball in the follow problem phase. For *n* move problems
Subsequent thinking time	The subject's mean speed of movement after the initial move has been made for *n* move problems

Spatial Working Memory (SWM)

Designed to assess: executive function and spatial working memory

Mode: *Clinical*

Stage	Number of Tokens	Number of Boxes	Practice or Assessed	Max Number of Inspections (per problem)
1				
2				
3				
4				
5				
6				
7				
8				
9				

Duration: ~5 minutes

Key Outcome Measures	Definition
Between errors	The total number of times the subject revisits a box in which a token has previously been found in the same problem (calculated for assessed problems only)
Strategy	For assessed problems with six boxes or more, the number of distinct boxes used by the subject to begin a new search for a token, within the same problem

Annex 5: Biomarkers and blood sampling data

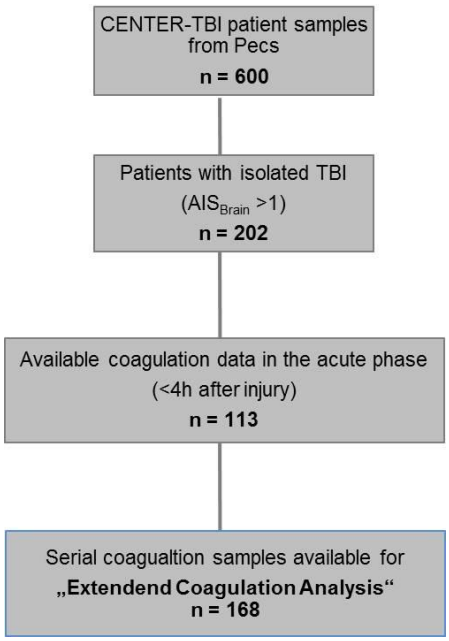
For all blood samples the curated Sample ID, collection date and time and freezer date and time, etc. has been uploaded to Mica/Opal.

We recommend using the "Biomarkers." domain, "CentralHaemostasis." domain and "Genetics." domain primarily (instead of the "labsampling."), as these contain the curated sample ID and curated collection/freezer dates and times.

In addition, for the biomarkers samples, the results of the following analyses were uploaded into Opal:

- ✓ Biomarkers.S100B
- ✓ Biomarkers.NSE
- ✓ Biomarkers.GFAP
- ✓ Biomarkers.UCH-L1
- ✓ Biomarkers.NFL
- ✓ Biomarkers.Tau

Concerning the extended coagulation analyses (CentralHaemostasis.), 600 patient samples from 9 sites were received. TBI patients with extracranial injuries and AIS Brain ≤1 were excluded, which gave a cohort of 202 patients, who had an isolated TBI. We focused on iTBI patients who received a coagulation test within the first 4 hours after TBI injury. In total, 113 iTBI had the information about early coagulation tests, together with serial blood collection samples, hence we achieved a sample number of 168 iTBI patients. Based on this iTBI cohort, an extended coagulation analysis was performed for which you will also find the results in Mica/Opal.



Annex 6: Frequency tables

We have been developing Frequency Tables for the CENTER-TBI data. These Frequency Tables do not lend themselves to analyses of the CENTER-TBI data, but serve to provide some orientating insight into the availability and distribution of data in the CENTER-TBI dataset.

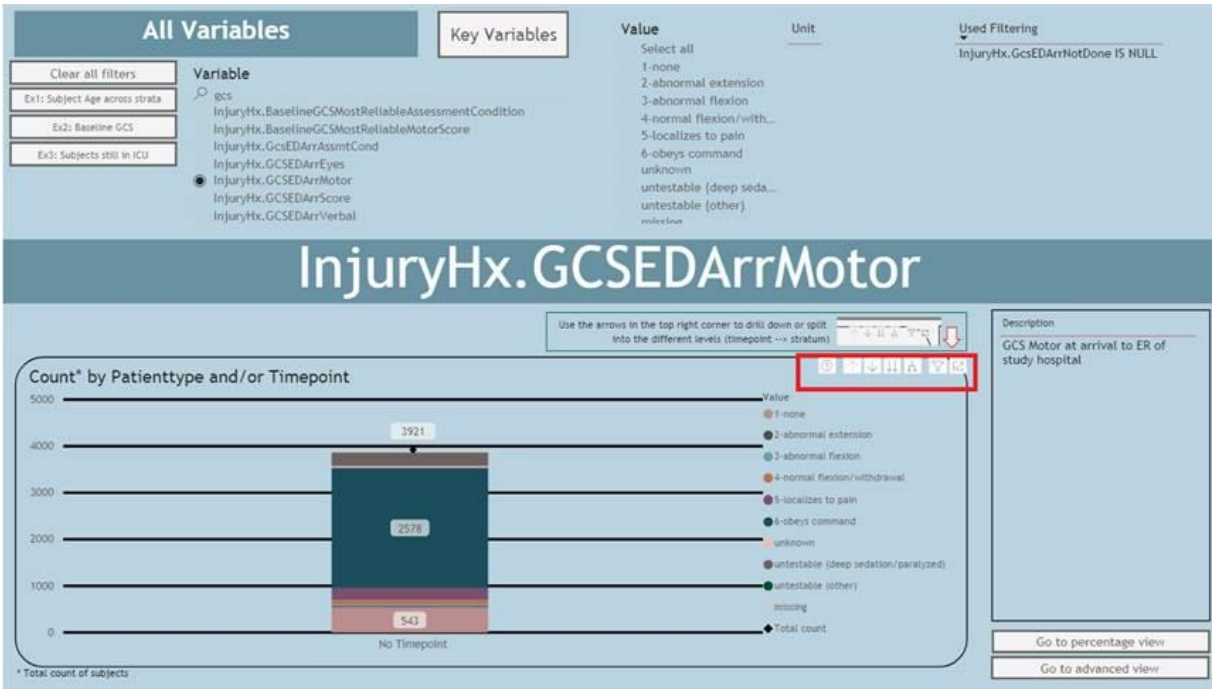
The Frequency Tables are available through the CENTER-TBI Data Dictionary:

When you select a variable in the list of the Frequency Tables, the corresponding values, unit (if applicable) and frequency table will appear per patient type (ER, Admission, ICU).

In the upper right corner of the "all variables" view you will also see the rules used to establish missingness (as not all variables are applicable for all patients) under "Used Filtering" (when rules apply).

If you move your mouse to the top right corner of the table (underneath the green frame), arrows will appear (see screen shot) on which you can click to see the data per timepoint (for longitudinal data) or the total amount of data.

In the downright corner of the screen, you will see a button to go to the percentage view or advanced view. In the advanced view, you will find more parameters about this variable. You can click on them & select the ones that interest you.



Annex 7: Upload of statistical scripts for analyses to CENTER-TBI Gitlab

According to the data access and publication policies of CENTER-TBI, researchers are requested to save their final variable search and to upload the final statistical scripts used in preparation of CENTER-TBI manuscripts (please also see the SOP manual for data access and publication requests on the CENTER-TBI website (https://www.center-tbi.eu/data)).

Save statistical scripts:

Login to the script application on the website: https://www.center-tbi.eu/scripts/**.** (Use the same login credentials that are used to login to Mica/Opal)

You will see on the left an "explorer" part where you can navigate through the folders to see the available shared-scripts and download scripts you would like to use.

Below the explorer part, you see an "upload form" where you can upload a new script (or several scripts) you would like to share. Make sure to mention the Study Plan number or Manuscript reference in the Notes section, together with a brief description. Once uploaded, your script will be reviewed and then released.

On the right part, you see the "info box" with text from the README file pertaining to the folder you open in the explorer part.

And below that you see the list of "latest uploads" with the status (approved or awaiting approval). When you have uploaded a script, you can see here if your script has been approved yet or is still awaiting approval.

Note:The interactive PDF may not work on all mobile devices

CENTER-TBI Core Data Collection : Guide to timing of assessments and investigations differentiated by stratum + Early MR imaging + Ultra early MR + External completion studies

CORE DATA

MR

Ultra Early MR

HR ICU

Extended Coagulation

TIME POINT		Day 1 (Adm)*	Post-op	Day 2	Day 3	Day 4	Day 5	2-3 Week	3 Month	6 Month	12 Month	24 Month
ER STRATUM: 1800												
Clinical data : on presentation/discharge ER and at time of follow-up												
Blood Sampling	**Routine hospital**	All										
	Biomarkers	All						MR Sites	MR Sites[2]			
	Genetics	All										
	ROTEM/TEG[3]	ROTEM/TEG[3]										
MRI (only MR sites)		Ultra early MR						MR Sites	MR Sites[2]			
Outcome Measures	**Neuropsych**							MR Sites	MR Sites[2]	All		
	Questionnaires							All	All(F2F)	All		
ADMISSION STRATUM: 1800												
Clinical data : on presentation, day 1-7, day 10, day 14, day 21 and day 28 unless discharge earlier												
Blood Sampling	**Routine hospital**	All										
	Biomarkers	All						MR Sites		All	MR Sites	MR Sites
	Genetics	All										
	Ext. Coag[3]	Ext. Coag[3]										
MRI (only MR sites)		Ultra early MR						MR Sites		MR Sites	MR Sites	MR Sites
Outcome Measures	**Neuropsych**									All	MR Sites	MR Sites
	Questionnaires							MR Sites	All	All	All	MR Sites
ICU STRATUM: 1800												
Clinical data : on presentation, day 1-7, day 10, day 14, day 21 and day 28 unless discharge earlier												
Blood Sampling	**Routine hospital**	All		All	All	All	All					
	Biomarkers	All		All	HR ICU	HR ICU	HR ICU	MR Sites		All	MR Sites	MR Sites
	Genetics	All										
	Ext. Coag[3]	Ext. Coag[3]	Ext. Coag[3]	Ext. Coag[3]								
MRI (only MR sites)		Ultra early MR						MR Sites		MR Sites	MR Sites	MR Sites
Outcome Measures	**Neuropsych**									All	MR Sites	MR Sites
	Questionnaires								All	All	All	MR Sites

Day 1 = Defined as day of Admission; in most cases this will be the same as day of injury, but in some (those patients presenting in the evening) it may be the next day.
Day 2 = Day after Admission
HR ICU: only sites participating in the HR ICU sub-study
[2] Initially target all patients scanned at 2-3 weeks, may later be restricted to only those with an abnormal MR at 2-3 weeks
[3] only sites participating in the extended coagulation sub-study