

## **REDCap - Important to Know Before Data Collection**

REDCap (Research Electronic Data Capture) is a secure web application for building and managing online surveys and databases for clinical studies.

REDCap is an integral tool in research at the Charité. The application was used to create the Acute Optic Neuritis Study (AON-S) and contains all the questionnaires needed for data collection.

REDCap has many features, including record IDs, repeated instruments, missing data codes, field comment log, warning alerts, and data quality tools.

### **Data Entry**

Data entry should be performed by trained personnel. REDCap users with the corresponding user rights can create records for each new study participants.

Records can be created by simply clicking on Add / Edit Records in the REDCap menu on the left in the Data Collection menu section (see figure 1).

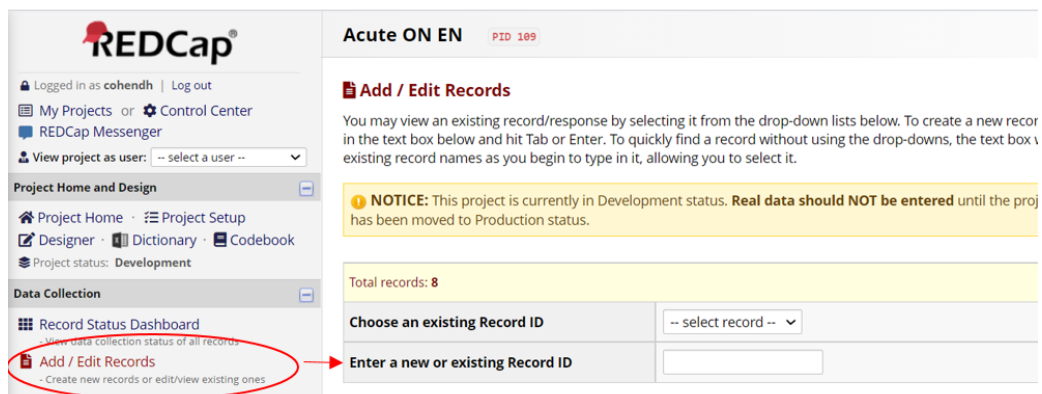


Figure 1: Create new records and new Record IDs

Record IDs - a unique key that can identify each record in the database. Each center involved in the Acute Optic Neuritis Study has a unique prefix for their record IDs (see table 1). Please use an underscore as separator.

Table 1: List of Record IDs prefix in "Acute ON" study

<b>Study Center</b>	<b>Prefix + Patient Number</b>	<b>Example</b>
Berlin, Germany	BER_AON_XXX	BER_AON_001
Boston, Massachusetts, USA	BOS_AON_XXX	BOS_AON_001
Irvine, California, USA	IRV_AON_XXX	IRV_AON_001
Copenhagen, Denmark	CPH_AON_XXX	CPH_AON_001
Lyon, France	LYN_AON_XXX	LYN_AON_001
Oxford, United Kingdom	OX_AON_XXX	OX_AON_001
Rochester, Minnesota, USA	RMN_AON_XXX	RMN_AON_001
Sydney, Australia	SYD_AON_XXX	SYD_AON_001
Tel Aviv, Israel	TLV_AON_XXX	TLV_AON_001
Verona, Italy	VR_AON_XXX	VR_AON_001

Repeated Instruments REDCap has a feature called “repeated instruments” that allows to use the same questionnaire multiple times in the same visit. Each repeat of the questionnaire is called an instance. In the record status dashboard a plus (+) sign will appear to allow REDCap users to add additional forms. The following instruments are defined as repeated instruments in the Acute Optic Neuritis Study: Attacks, Lab Analysis, Magnetic Resonance Imaging, Perimetry, Visual Acuity, Fundoscopy, Visual Evoked Potential, and Optical Coherence Tomography.

Data Collection Instrument	Acute Visit
Acute ON Inclusion / exclusion [InEx]	<input type="radio"/>
Acute ON Master Data [Master]	<input type="radio"/>
Acute ON Diagnosis [Diag]	<input type="radio"/>
Acute ON Attacks [Rlps]	<input checked="" type="radio"/> +

Figure 2: Repeated instrument Attacks

Missing data codes - Another important REDCap tool during data collection is that of missing data codes. It allows the user to mark missing information with a unique code to indicate why this field lacks a value. The user can select the missing data code by clicking on the 'M' icon next to each field when viewing a data entry form, which will bring up a list of available missing data codes. In the Acute Optic Neuritis Study these are:

- Missing (NaN) – Data is not available or unknown
- Does not apply (DNA) - Field does not apply to study participant
- Ongoing (cont.) – the information is in process, not available yet

The screenshot shows a data entry form with several fields. A red arrow points to the 'M' icon next to the 'OD - Sphere' field. A dropdown menu is open, showing the following options: [Clear value], Missing (NaN), does not apply (DNA), and ongoing (cont.). The 'OD - Axis' and 'OS - Sphere' fields are highlighted in green.

Figure 3: Missing data codes

Field Comment Log - When entering data into a data form, you may have comments or caveats concerning specific fields. If this is the case, you may utilize the Field Comment Log by clicking the speech bubble next to the field in the record you are working on.

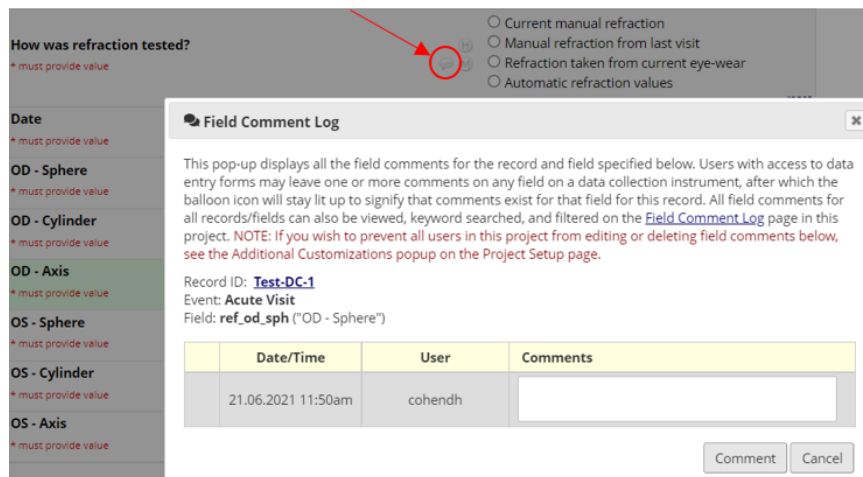


Figure 4: Field comment log

**Form Completion Status** - this allows users to indicate the status of the record's data: ; **red** – incomplete; **yellow** – unverified; **green** – complete.

SO, if a questionnaire has been completed but one or more questions cannot be answered and thus data is missing, the questionnaire status (form status) should be set to "Incomplete".

It is recommended to assign the questionnaire status as "Unverified" to completed questionnaires that have not been verified by a second person.

Only if the questionnaire has been completed and also verified by a second person, the questionnaire status should be set to "complete".

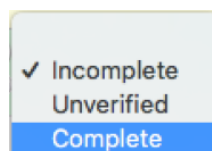


Figure 5: REDCap user interface of questionnaire status

## **Handling data errors**

**Data quality tool** - The data quality tool, which allows users to find specific data errors in study data by creating and executing data quality rules. This tool relies on the validations and data specifications made in the eCRF design. With this tool, users can find information about missing data, outliers, non-permitted values, and rules that the user created.

ata Quality Rules ✔ Processing Complete! Execute rules:

Apply to:

Rule #	Rule Name	Rule Logic (Show discrepancy only if...)	Real-time execution <input type="button" value="?"/>	Total Discrepancies
A	Blank values*	-		5814 <a href="#">view</a>
B	Blank values* (required fields only)	-		1813 <a href="#">view</a>
C	Field validation errors (incorrect data type)	-		0 <a href="#">view</a>
D	Field validation errors (out of range)	-		1 <a href="#">view</a>
E	Outliers for numerical fields (numbers, integers, sliders, calc fields)**	-		4 <a href="#">view</a>
F	Hidden fields that contain values***	-		2 <a href="#">view</a>
G	Multiple choice fields with invalid values	-		1 <a href="#">view</a>
H	Incorrect values for calculated fields	-		108 <a href="#">view</a>
I	Fields containing "missing data codes"	-		7 <a href="#">view</a>
1	Anamnesis Abnormalities - not Applicable	[anamnesis_period_anomaly(0)] = '1' and ([anamnesis_period_anomaly(5)] = '1' or [anamnesis_period_anomaly(4)] = '1' or [anamnesis_period_anomaly(3)] = '1' or [anamnesis_period_anomaly(2)] = '1' or [anamnesis_period_anomaly(1)] = '1'		0 <a href="#">view</a>

Figure 6: Data quality rules tool

Warning alerts - Warning messages may occur if mandatory fields have not been filled in, if a specified data quality criterion has been violated or if the input does not comply with the permitted field validation (example: a number is outside the permitted range of values). If a warning message cannot be resolved by correcting the values or there is a technical problem, please contact the REDCap administrator (see figure 7).

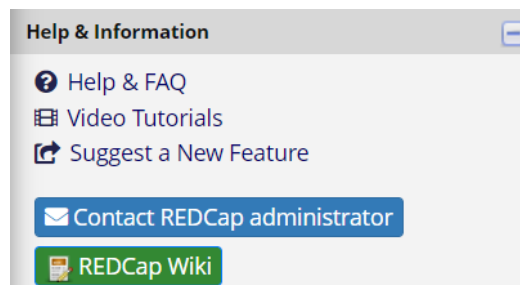


Figure 7: REDCap user interface button to contact REDCap admin

### Relevant links

<https://redcap.charite.de/ncrc/> - direct link to Charité REDCap Web Application

Overview of Basic Data [Entry](#) in REDCap– Official Video Tutorial by the REDCap project

<https://www.project-redcap.org/> - official REDCap Project Website

Author: [Maja Olszewska](#) Maja Olszewska & Danielle Cohen [Danielle Cohen](#), REDCap and Clinical Data Management Team | NeuroCure Clinical Research Center (NCRC) Charité | Berlin, Germany

Contact Technical support: REDCap [Administrator](#)