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).

REDCap	Acute ON EN PID 109		
Logged in as cohendh Log out My Projects or Control Center REDCap Messenger View project as user: select a user	Add / Edit Records You may view an existing record/response by in the text box below and hit Tab or Enter. To existing record names as you begin to type in	r selecting it from the drop-down lists below. To create a new recor quickly find a record without using the drop-downs, the text box v i it, allowing you to select it.	
Project Home and Design	• NOTICE: This project is surrouth in Day	element status. Real data should NOT be entered until the proj	
Aroject Home · ﷺ Project Setup Zoesigner · ■ Dictionary · ■ Codebook Project status: Development	has been moved to Production status.	elopment status, keal data snouid NOT de entered until the proj	
Data Collection	Total records: 8		
Record Status Dashboard	Choose an existing Record ID	select record 🗸	
Add / Edit Records - Create new records or edit/view existing ones	Enter a new or existing Record ID		

Figure 1: Create new records and new Record IDs

<u>Record IDs -</u> 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

Study Center	Prefix + Patient Number	Example
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

<u>Repeated Instruments</u> 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]	۲
Acute ON Master Data [Master]	۲
Acute ON Diagnosis [Diag]	
Acute ON Attacks [Rlps]	()+

Figure 2: Repeated instrument Attacks

<u>Missing data codes -</u> 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

Date * must provide value	H Today D-M-Y
OD - Sphere * must provide value	
OD - Cylinder * must provide value	(Clear value)
OD - Axis * must provide value	does not apply (DNA) ongoing (cont.)
OS - Sphere * must provide value	

Figure 3: Missing data codes

<u>Field Comment Log</u> - 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.

How was refraction tested * must provide value	d?		Current manual refraction Manual refraction from last visit Refraction taken from current eye-wear Automatic refraction values		
Date + must provide value	🗣 Field Comment Log		×		
OD - Sphere * must provide value	This pop-up displays all the field comments for the record and field specified below. Users with access to data entry forms may leave one or more comments on any field on a data collection instrument, after which the balloop could take it us to kinglic that compared switz for the field for this researd. All field comments for				
OD - Cylinder * must provide value	all records/fields can also be viewed, keyword searched, and filtered on the <u>Field Comment Log</u> page in this project. NOTE: If you wish to prevent all users in this project from editing or deleting field comments below, registered the filtered of the <u>Field Comment Log</u> page in this project. NOTE: If you wish to prevent all users in this project from editing or deleting field comments below,				
OD - Axis * must provide value	D - Axis See the Additional Costonizations populp on the Project Setup page. nust provide value Event: Acute Visit S - Sphere Field: ref_od_sph ("OD - Sphere")				
OS - Sphere					
* must provide value	Date/Time	User	Comments		
OS - Cylinder * must provide value	21.06.2021 11:50am	cohendh			
OS - Axis					
* must provide value			Comment Cancel		

Figure 4: Field comment log

<u>Form Completion Status -</u> 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

<u>Data quality tool -</u> 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	ata Quality Rules Apply to:All records - V					
	Rule #	Rule Name	Rule Logic (Show discrepancy only if)	Real-time execution ?	Tota Discrepa	l ncies
	А	Blank values*	-		5814	<u>view</u>
	В	Blank values* (required fields only)			1813	view
	С	Field validation errors (incorrect data type)	-		0	view
	D	Field validation errors (out of range)	-		1	view
	E	Outliers for numerical fields (numbers, integers, sliders, calc fields)**	-		4	<u>view</u>
	F	Hidden fields that contain values***	-		2	<u>view</u>
	G	Multiple choice fields with invalid values	-		1	<u>view</u>
	н	Incorrect values for calculated fields	-		108	<u>view</u>
	I.	Fields containing "missing data codes"	-		7	view
	1	Anamnesis Abnormalities - not Applicaple	[anamnesis_period_anomaly(0)] = '1' and ([anamnesis_period_anomaly(5)] = '1' or [anamnesis_period_anomaly(4)] = '1' or [anamnesis_period_anomaly(2)] = '1' or [anamnesis_period_anomaly(2)] =	۲	0	<u>view</u>

Figure 6: Data quality rules tool

<u>Warning alerts -</u> 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

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Contact Technical support: REDCap Administrator