

Setting up REDCap Clinical Data Pull with Cerner Developer Sandbox

March 2018

Note: As of March 2018, only the “Push New Patient Data from EHR” stream is operational. The “Pull New Patient Data from EHR” stream requires as-yet unavailable functionality from Cerner’s Smart on FHIR implementation: namely, the *offline_access* scope for *Provider*-facing apps. This feature is currently under consideration to be implemented at Cerner.

Cerner Smart on FHIR URLs:

- App Sandbox: <https://code.cerner.com/developer/smart-on-fhir/apps>
- Tutorial: <http://engineering.cerner.com/smart-on-fhir-tutorial/>
- Documentation: <http://fhir.cerner.com/millennium/dstu2/>

Requirements:

- Test server serving REDCap over HTTPS. Such websites usually have a Fully Qualified Domain Name and are not behind an institutional firewall.
- UPDATE permissions on the database backend for activating Clinical Data Pull functionality.
- Access to said Test server (Remote Desktop, SSH, etc.) to modify REDCap code.
- Administrator-level REDCap account.

Tested and working on REDCap 8.2.1, on 3/9/2018.


This process involves switching between the Cerner Sandbox and REDCap, so it is recommended that you have two browser windows open side-by-side.

Register New Cerner App in Cerner FHIR App Sandbox. Do this first as it takes 15-20 minutes for the registered app to activate and become available for testing.

Field	Description
App Name	REDCap Test at <Institution>.
SMART Launch URI	https://redcap_testSite_FQDN.edu/ehr.php?user=your_redcap_acct_username
Redirect URI	https://redcap_testSite_FQDN.edu/ehr.php
App Type	Provider (Clinical Data Pull module is a Provider-facing app)
FHIR Spec	dstu2 (The latest spec version supported by Cerner.)

Field	Description
Authorized	Yes (Authorized App will use secured OAuth2 authentication.)
Standard Scopes	launch, profile, open_id (all selected by default) Keep offline_access unchecked for now (until it's implemented at Cerner) → online_access is automatically checked.
User Scopes	None
Patient Scopes	AllergyIntolerance, Condition, Immunization, MedicationOrder, Observation, Patient — these are same the scopes specified in the "Setup Instructions (General)" documentation for REDCap Clinical Data Pull.

After the App has been registered, click open the app in the Cerner Sandbox to verify its configuration.



Test REDCap Third Test

Click Begin Testing to create a testing environment

[Begin Testing](#)

App Info

Client Id:

App Id:

SMART Launch URI: .edu/ehr.php?user=username">https://.edu/ehr.php?user=username

Redirect URI: .edu/ehr.php">https://.edu/ehr.php

App Type: provider

FHIR Spec: dstu2 - "https://fhir-ehr.sandboxcerner.com/dstu2/0b8a0111-e8e6-4c26-a91c-5069cbc6b1ca"

Authorized: true

Standard Scopes:

launch

profile

openid

online_access

Patient Scopes:

patient/AllergyIntolerance.read

patient/Condition.read

patient/Immunization.read

patient/MedicationOrder.read

patient/Observation.read

patient/Patient.read

[Edit Details](#)

[Delete App](#)

In REDCap, set up “Clinical Data Interoperability Services” from the Control Center:

- *Client ID*: copy over from Cerner App Settings
- *Client Secret*: leave blank
 - (Until Cerner enables “offline_access” for “Provider” apps)
- *FHIR Base URL*: copy over the URL next to “FHIR Spec: dstu2”
 - Click “Auto-Find” on the REDCap side to complete the token URL and authorize URL fields.

EHR-specific and FHIR-specific settings

Client ID and Client Secret for the FHIR app/client created for REDCap in the EHR

These are essentially a username and API key that REDCap will use to communicate with your EHR using the SMART on FHIR services. These client values will likely need to be generated for you by your EHR's technical team.

Client ID:

Client Secret: [Show secret](#)

(Make sure that the Client Secret is the secret value itself and not the stored hashed value of the secret.)

SMART on FHIR web service URLs

The base URL endpoint should have been provided to you by your EHR's technical team.

FHIR Base URL:


The token and authorize URLs can often be found using the base URL you have provided above and then by clicking the 'Auto-find' button below. If the Auto-find method is not successful, then the Token URL and Authorize URL below will need to be provided to you by your EHR's technical team. [Auto-find token URL and authorize URL](#)

FHIR Token URL:

FHIR Authorize URL:

In REDCap, create a Test Project and enable Clinical Data Pull from the Project Setup page.

Build an instrument containing the desired patient fields (name, address, birthdate, etc.), activate Clinical Data Pull, and set up field mappings as directed.

 Optional

Enable optional modules and customizations

☒ Repeatable instruments

☒ Auto-numbering for records

☒ Scheduling module (longitudinal only)

☒ Randomization module

☒ Designate an email field to use for invitations to survey participants

Settings displayed to Administrators only:

☒ DDP on FHIR - Dynamic Data Pull from EHR

☒ Twilio SMS and Voice Call services for surveys

Important: Your FHIR-enabled Project **must** have a text field with the *mrn_generic* validation option, otherwise the records will not be available for selection.

The field mapping process is described here:

<https://redcap.vanderbilt.edu/consortium/videoplayer.php?video=ddp01.swf>



In progress

I'm done!

Set up DDP on FHIR - Dynamic Data Pull from EHR

The first step in setting up the Dynamic Data Pull (DDP) from an external source system is to map the fields in your project to fields from the source system. Once the fields have been mapped, REDCap will then know what data to import from the source system and where to store it in the REDCap project. [Tell me more](#)

Go to [Set up mapping for Dynamic Data Pull \(DDP\)](#)

SETTINGS

Preview Fields (optional):

Source system fields can be selected that will provide a quick preview of data from the source system when a user initially enters the value of the source ID field (e.g. Medical record number) on a data entry form. This can be used for confirming that the value of the source ID field is correct before any other data is pulled from the source system. Displaying the values of preview fields can create valuable context for validating the source ID field's value and helps ensure the quality of the data.

Select preview fields from EHR (up to 5):

name-given "First name"

name-family "Last name"

gender "Sex"

address-city "Address (city)"

address-state "Address (state)"

[Add another preview field](#)

Default day offset (for temporal fields):

When pulling temporal data (i.e. fields with an associated timestamp) from the source system, the day offset will be used in conjunction with the value of a mapped REDCap date/time field to create a window of time for searching for data in the source system. Only data within that window of time will be displayed during the adjudication process. This helps to provide a buffer of time in the instance that the date/time value from REDCap and/or the timestamp from the source system lack some amount of precision.

Default day offset: days

min: 0.01 days (15 minutes), max: 365 days

MAP SOURCE FIELDS TO REDCAP FIELDS

External Source Field (EHR)	Map to REDCap Field	Map to REDCap date/time field (Date/time value is used with day offset to construct window of time when searching for source data)	Remove mapping
id "Medical record number" ★ Source Identifier Field	cerner_mrn "Cerner MRN" <input type="button" value="x"/>		
Demographics			
address-city "Address (city)"	city "City" <input type="button" value="x"/>		<input type="button" value="x"/>
address-line "Address (street)"	addr_st "Street" <input type="button" value="x"/>		<input type="button" value="x"/>
address-postalCode "Address (postal code)"	zipcode "Zip" <input type="button" value="x"/>		<input type="button" value="x"/>
address-state "Address (state)"	state "State" <input type="button" value="x"/>		<input type="button" value="x"/>
birthDate "Date of birth"	dob "Date of birth" <input type="button" value="x"/>		<input type="button" value="x"/>
email "Email address"	email "E-mail" <input type="button" value="x"/>		<input type="button" value="x"/>

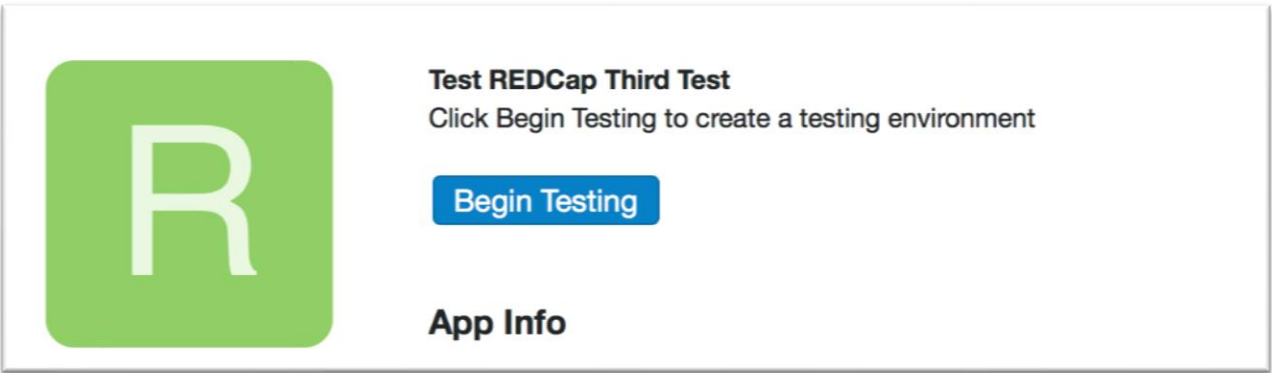
Access the REDCap server, edit REDCap code so that scopes are specified explicitly at the authorization request step.

Locate FhirEhr.php in the latest (most current) REDCap code folder under the web root folder, and make the following change:

- Location: /REDCap_v8.x.x/Classes/FhirEhr.php, line 10

- Change \$fhirScope to
 - `private $fhirScope = 'patient/Patient.read
patient/Observation.read patient/Condition.read
patient/MedicationOrder.read patient/Immunization.read
patient/AllergyIntolerance.read launch';`

Click into Cerner App logo, and “Begin Testing”



Select any test patient and click “Next”

Testing Details

SMART, Wilma

Female DOB: 1947-03-16

Communication language set to Hindi

SMART, Nancy

Female DOB: 1980-08-11

Patient with pregnancy condition

SMART, Joe

Male DOB: 1976-04-29

SMART, Hailey

Female DOB: 2003-12-02

SMART, Fred Rick

Male DOB: 1946-08-22

SMART, Valerie S

Female DOB: 1984-04-15

Rotunda, Rhonda

Female DOB: 1980-05-01

Patient with pregnancy condition

Read, Amber

Female DOB: 2005-11-21

SMART, Dave

Male DOB: 1980-07-15

MARTIN-GREEN, Sonequa

Female DOB: 1985-04-12

SMART, Connie

Female DOB: 1972-12-19

Patient with common technical issues

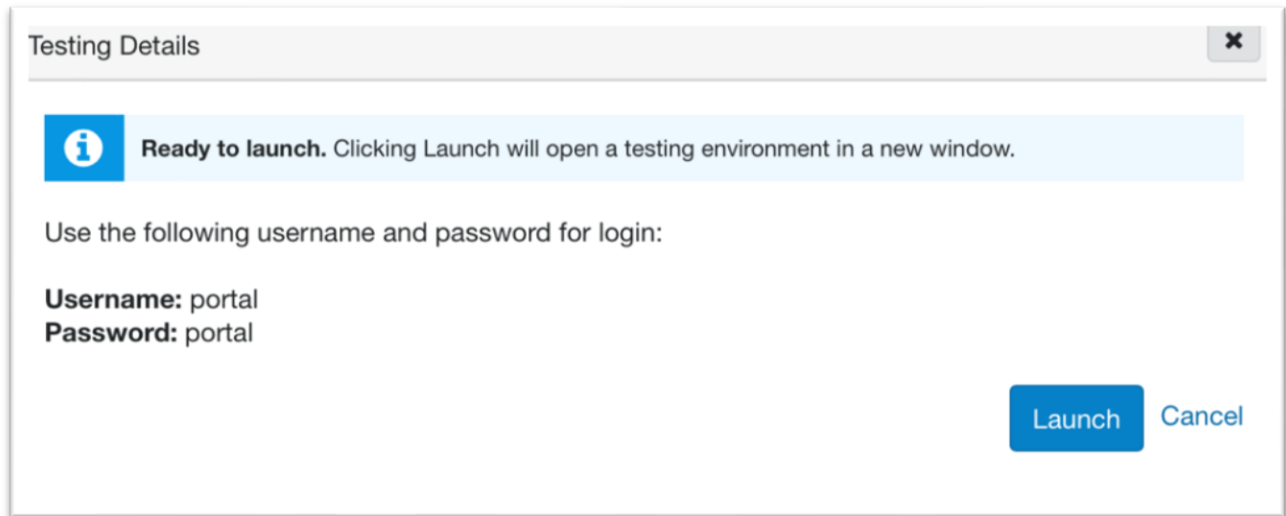
Would you like a demographics banner to be shown?

☒ Yes ☐ No

Next

Cancel

Click “Launch” to access a test Cerner Millenium EHR application portal



If prompted, log in to the Millennium Sandbox using the username and password provided above.

Once authorization completes, log in to REDCap when prompted.

Select your project containing `mrn_generic` field from the drop-down menu, click “+Add Patient to Project” and follow the prompts to “adjudicate” and import the patient record.

Note: After launch, the REDCap interface will appear in a limited view, just as it would appear in a EHR launch frame. This view hides the sidebar and displays the patient record information at the top of the page (see below). To leave this view, clear recent cookies, and log out and back in. Otherwise, the view will expire normally in 30-60 minutes when your Cerner session token expires.

EHR / REDCap Portal

-- select one of your existing REDCap projects

Not a viable project

Text Encoding Test

[Project cannot be utilized since it has no field using an 'mrn' field validation type]

+ Add patient to project

Smart on FHIR Test

Confirm: Add patient to project?

You may add this patient to this REDCap project by clicking the 'Create record' button below, which will create a new record in the project and will add the patient's ID number (i.e., medical record number) to that record.

Project: Smart on FHIR Test

Create record

Cancel

EHR / REDCap Portal

-- select one of your existing REDCap projects to a

Not a viable project

Text Encoding Test

[Project cannot be utilized since it has no field using an 'mrn' field validation type]

[+ Add patient to project](#)

Smart on FHIR Test

SUCCESS!



The record was successfully created. If you wish, you may now may now navigate to the project to view or add data to the new record.

9 new DDP items to adjudicate

[View patient in project](#)

[Close](#)

Record Home Page

The grid below displays the form-by-form progress of data entered for the currently selected record. You may click on the colored status icons to access that form/event.

 Choose action for record ▼





Study ID 10

 new items from source system

[View](#)

 Data Collection Instrument	Status
Basic Demography Form	


Legend for status icons:

-  Incomplete  Incomplete
-  Unverified
-  Complete

Adjudicate data from EHR

[View DDP adjudication instructions](#)

Fetching data for **Study ID "10"**

 Refresh data from EHR

New items: **9**

Time of last data fetch: less than a minute ago

[View 1 h](#)

REDCap Field	REDCap Date/Time	EHR Source Date/Time	REDCap Current Value	E S
Basic Demography Form				
first_name "First Name"	-	-		J
last_name "Last Name"	-	-		S
addr_st "Street"	-	-		1
city "City"	-	-		O
state "State"	-	-		K
zipcode "Zip"	-	-		6
telephone "Phone number"	-	-		9
dob "Date of birth"	-	-		1
sex "Sex"	-	-		M

Saved successfully!



Successfully imported!

Data was successfully imported from
the source system and saved for Study
ID "**10**"!

Close