Setting up REDCap Clinical Data Pull
with Cerner Developer Sandbox
March 2018

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.
→ 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://**your-redcap-domain.org**/ehr.php
Redirect URI	https://**your-redcap-domain.org**/ehr.php
App Type	Provider (Clinical Data Pull module is a Provider-facing app)
FHIR Spec	dstu2 (The latest spec version supported by Cerner.)
Authorized	Yes (Authorized App will use secured OAuth2 authentication.)
Standard Scopes	launch, profile, open_id (all selected by default) online_access is automatically checked.
User Scopes	AllergyIntolerance, Binary, Condition, DocumentReference, MedicationOrder, Observation, Patient
Patient Scopes	AllergyIntolerance, Binary, Condition, DocumentReference, 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.
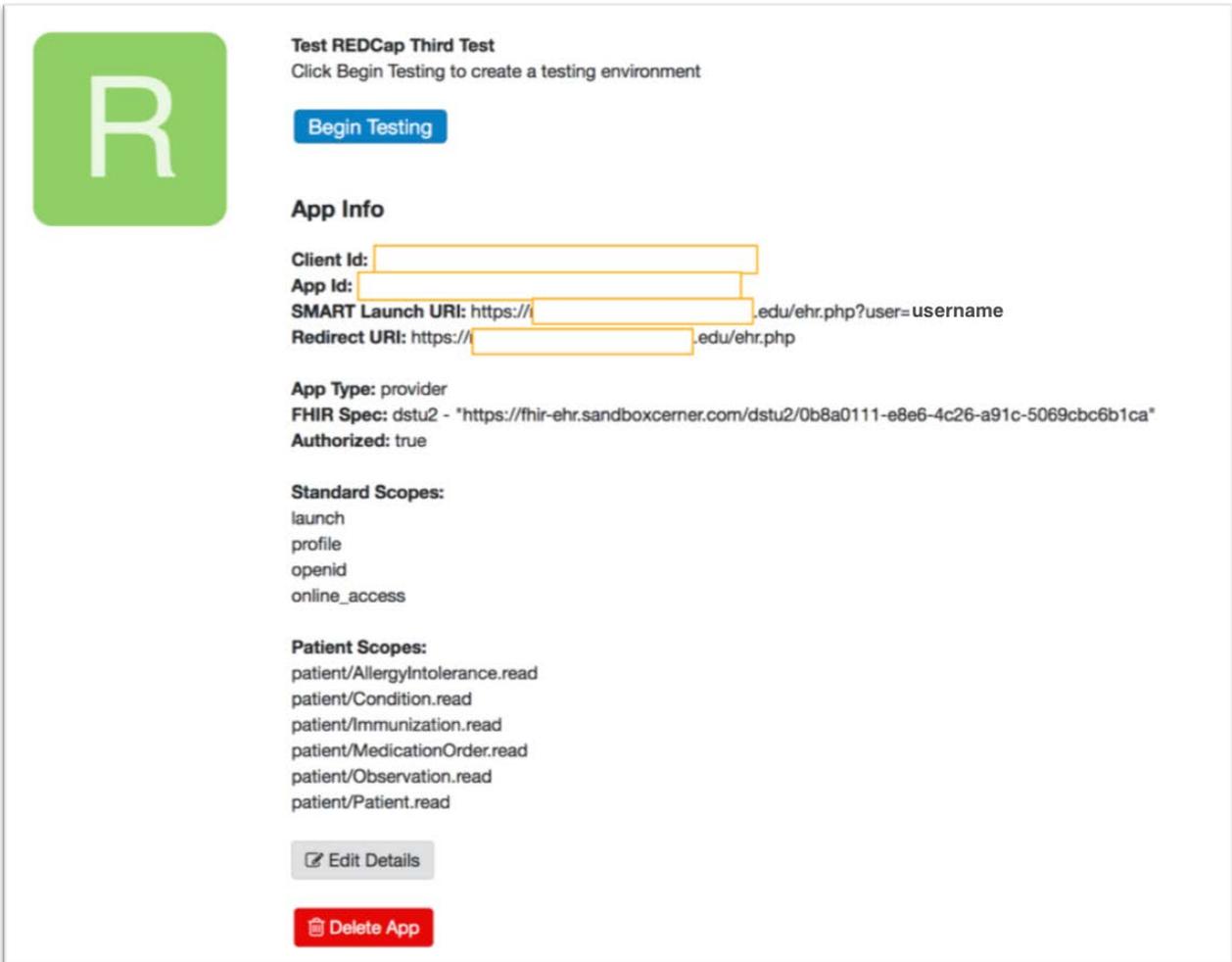
Test REDCap Third Test
Click Begin Testing to create a testing environment

Begin Testing

App Info

Client Id:
App Id:
SMART Launch URI: https://_____.edu/ehr.php?user=username
Redirect URI: 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
- → *FHIR Base URL*: copy over the URL next to "FHIR Spec: dstu2"
  - o 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: https://fhir-ehr.sandboxcerner.com/dstu2/0b8a0111-e8e6-4c26-a91c-50([Test]

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: https://authorization.sandboxcerner.com/tenants/0b8a0111-e8e6-4c26-ã [Test]

FHIR Authorize URL: https://authorization.sandboxcerner.com/tenants/0b8a0111-e8e6-4c26-ã [Test]

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.

Enable optional modules and customizations

Optional

I'm done!

[Enable] ⊖ Repeatable instruments [?]
[Disable] ✓ Auto-numbering for records [?]
[Enable] ⊖ Scheduling module (longitudinal only) [?]
[Enable] ⊖ Randomization module [?]
[Enable] ⊖ Designate an email field to use for invitations to survey participants [?]

[Additional customizations]

Settings displayed to Administrators only:

[Disable] ✓ DDP on FHIR - Dynamic Data Pull from EHR [?]
[Enable] ⊖ 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

Set up DDP on FHIR - Dynamic Data Pull from EHR

In progress

I'm done!

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: ± ◇ 1 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 mappin
id "Medical record number" ⭐ Source Identifier Field	cerner_mrn "Cerner MRN"		
Demographics			
address-city "Address (city)"	city "City"		✖
address-line "Address (street)"	addr_st "Street"		✖
address-postalCode "Address (postal code)"	zipcode "Zip"		✖
address-state "Address (state)"	state "State"		✖
birthDate "Date of birth"	dob "Date of birth"		✖
email "Email address"	email "E-mail"		✖

Click into Cerner App logo, and "Begin Testing"
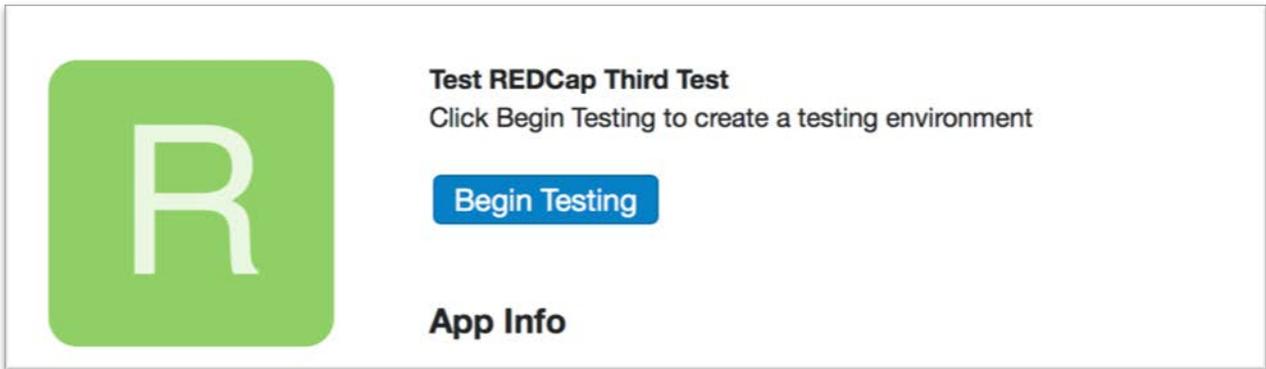
Test REDCap Third Test
Click Begin Testing to create a testing environment

Begin Testing

App Info

Select any test patient and click "Next"
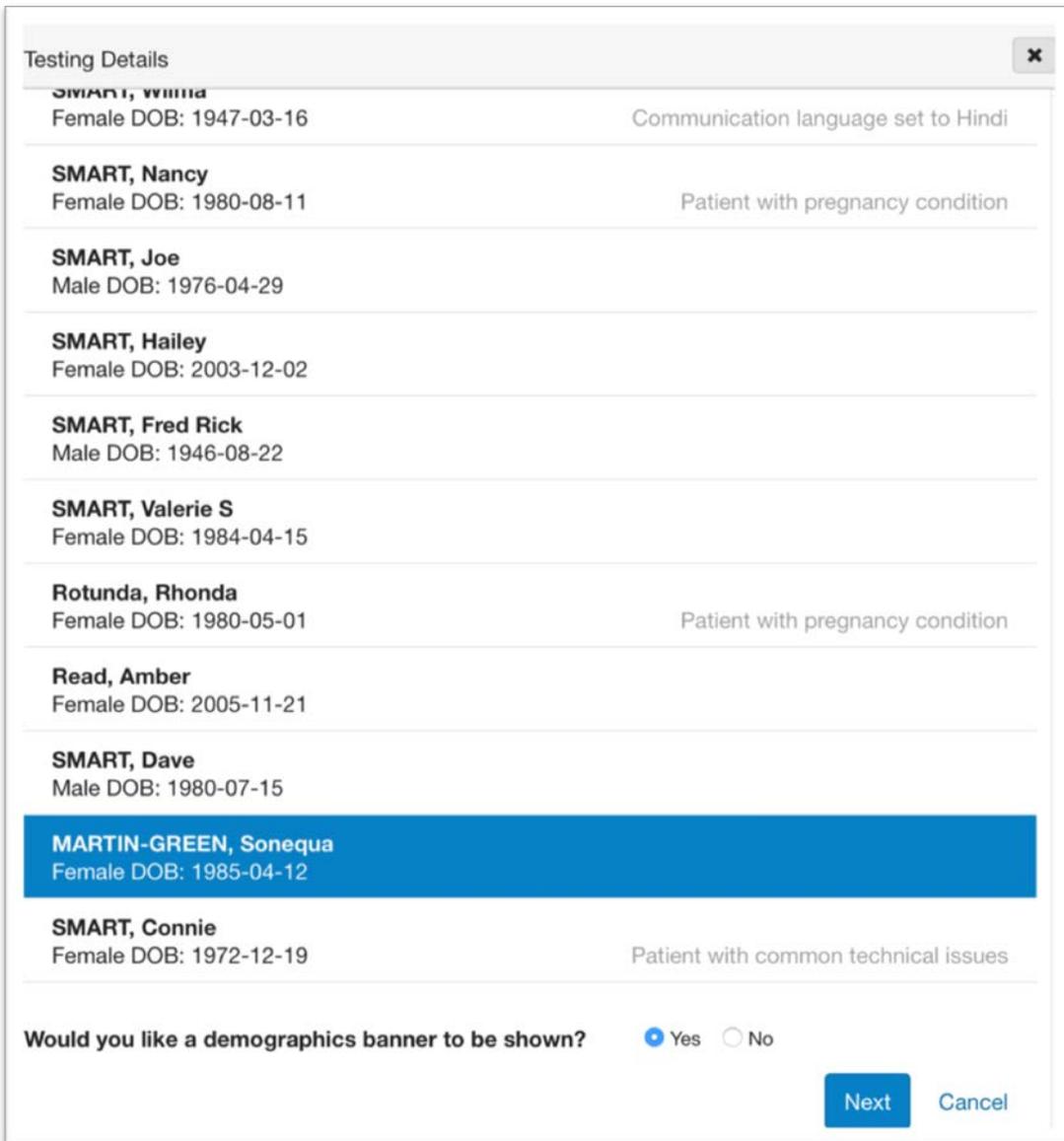
Testing Details

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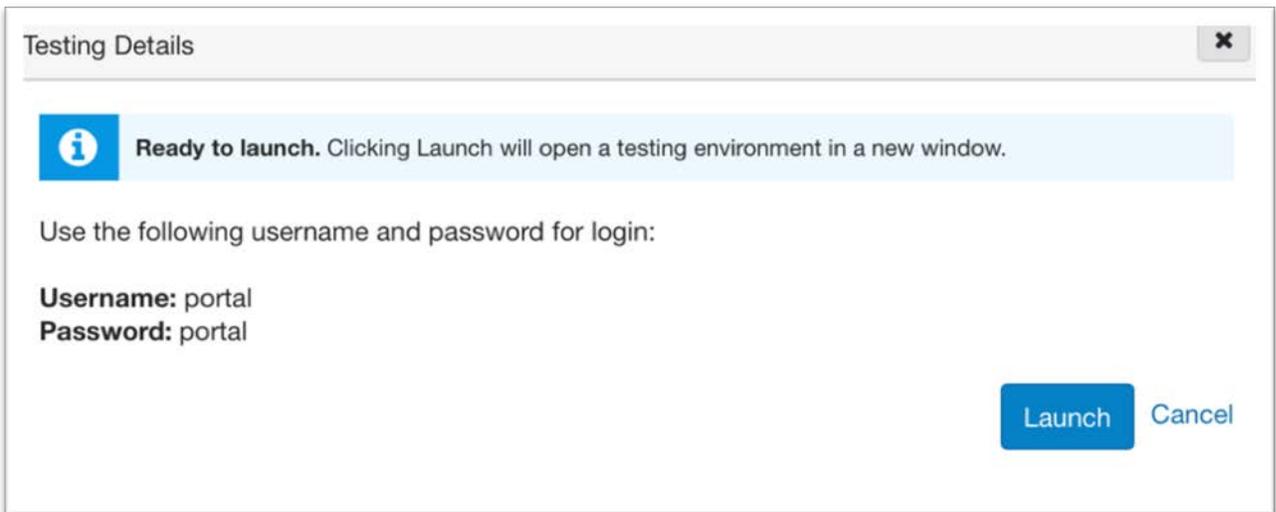
If prompted, log in to the Millennium Sandbox using the username and password provided above.

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 projec

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.

Legend for status icons:
⦿ Incomplete   ⦾ Incomple
🟡 Unverified
🟢 Complete

☑ Choose action for record ▽

Study ID **10**

⑨ **new items from source system**   View

Data Collection Instrument	Status
Basic Demography Form	🔴

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	
Basic Demography Form				
first_name "First Name"	-	-		J
last_name "Last Name"	-	-		S
addr_st "Street"	-	-		1
city "City"	-	-		C
state "State"	-	-		K
zipcode "Zip"	-	-		6
telephone "Phone number"	-	-		9
dob "Date of birth"	-	-		1
sex "Sex"	-	-		N

Saved successfully! ✖

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

Close