



Interaction between SAS and REDCap

MAHESH MAIYANI

What is REDCap?

- ▶ REDCap (Research Electronic Data Capture)
- ▶ Most of us know that we use REDCap to collect survey data
- ▶ REDCap is a web application used to build and manage online surveys and databases.
- ▶ RAs enter data of study participants to REDCap
- ▶ Later analysts export this data to SAS for analysis

How to interact with REDCap?

- ▶ As a programmer, we:
 - ▶ create a .CSV file to import data into REDCap from a SAS dataset and
 - ▶ do the same to export data from REDCap as a .CSV and
 - ▶ then import that csv file into SAS to create a SAS dataset.
- ▶ We were doing all this importing and exporting manually which is time consuming and more importantly, we have to remember every day or every week to upload/download data to/from redcap
- ▶ A more efficient method is available now. We can interact with REDCap directly through SAS programming.
- ▶ **Known as REDCap API (Application Programming Interface)**

REDCap API Call/Parameters

- ▶ An API is just a defined way for a program to accomplish a task.
- ▶ The REDCap API is an interface that allows external applications to connect to REDCap remotely, and is used for programmatically retrieving or modifying data or settings within REDCap.
 - ▶ Programs talk to the REDCap API over HTTP, the same protocol that your browser uses to visit and interact with web pages.
- ▶ Programmers can use the REDCap API to automate data imports/exports for a specified REDCap project.

REDCap API Call/Parameters Cont'd...

► To directly interface between REDCap and SAS, we need the following:

1. First we need to create API parameter, text file which will create a bridge between REDCap and SAS
2. Programmers must have API Import/Export privileges in the project
3. Programmers also require an API token: The API token is specific to your REDCap project and username
 - Each token is unique to each user for each project.
 - The REDCap API uses tokens as a means of secure authentication.
 - You can request an API Token for the project from your REDCap admin.
 - Tokens expire every 12 months.
4. You also need the **REDCap specific URL** for your site.

Example: Export from REDCap

- ▶ Define In, Out and Status file

- ▶ Eg: filename in "&dir.\in.txt";

filename out "&dir.\out.csv";

filename status "&dir.\status.txt";

Create the text file to hold the API parameters this will allow us to pull data from REDCap

```
data _NULL_;
```

```
file in;
```

```
put"%NRStr(content=record&type=flat&format=csv&fields=mrn,  
enrollment_status, wave&token=)&mytoken&&";
```

```
run;
```

Export to REDCap Cont'd...

- ▶ Execute the http procedure - this will run the pull from REDCap and grab everything requested

- ▶ proc http

```
in = in
```

```
out = out
```

```
headerout = status
```

```
url = myurl (location of redcap database api)
```

```
method = 'post';
```

```
run;
```

```
/*now read csv file into SAS*/
```

```
proc import out=redcap_data datafile="&dir.\out.csv"
```

```
dbms=csv replace;
```

```
getnames=yes;
```

```
guessingrows=32767; /*this option ensures we do not truncate any fields*/
```

```
run;
```

Example: Import to REDCap

- ▶ Define In, Out and Status file

```
filename in "&dir.\API_IMPORT_CSV\in.csv";
```

```
filename out "&dir.\API_IMPORT_CSV\out.csv";
```

```
filename status "&dir.\API_IMPORT_CSV\status.txt";
```

```
/*Create API Parameter row*/
```

```
data _NULL_;
```

```
file in lrecl=1073741823;
```

```
put "%NRStr(content=record&format=csv&type=flat&returnformat=csv&returnContent=)  
    &returnContent.%NRStr(&overwriteBehavior=)&overwriteBehavior.%NRStr(&)token=&token.%NRStr(&)data=";
```

```
run;
```

```
proc export data=sasdata outfile="&dir.\API_IMPORT_CSV\temp_dataAPI.csv"
```

```
dbms = csv replace; run;
```

- ▶ /*Concatenate the 2 together*/

```
data _null_;
```

```
file in lrecl=1073741823;
```

```
infile "&dir.\API_IMPORT_CSV\temp_dataAPI.csv" ls=32767;
```

```
input x : $32767.;
```

```
put _infile_;
```

```
run;
```

Import to REDCap Cont'd...

- ▶ Execute the http procedure to import data to REDCap

- ▶ proc http

```
in = in
```

```
out = out
```

```
headerout = status
```

```
url = myurl (location of redcap database api)
```

```
method='post'
```

```
ct="application/x-www-form-urlencoded";
```

```
run;
```

Macro to Import data to REDCap:

- ▶ **MACRO Parameters

- ▶ REQUIRED:

data = "REDCap ready" SAS dataset (must be in EXACT formatting as in REDCap database)

dir = UNQUOTED filepath to the directory that you want the API import information dumped into

token = User and Project specific token acquired from REDCap

url = REDCap specific URL for your site (you can incorporate this into the code once comfortable)

- ▶ OPTIONAL (Defaulted if not specified):

- ▶ OverwriteBehavior = API parameter for overwrite behavior in REDCap (values=normal | overwrite)

- ▶ returnContent = Specify what REDCap should return in the "out" files (values=count | ids | nothing)

Macro Example:

- ▶ %REDCap_IMPORT(data=, dir=, token=, url=, overwriteBehavior=normal, returnContent=);
- ▶ %REDCap_IMPORT(data=patient_appts_5, dir=\\KPCOIHR1.IHR.OR.KP.ORG\Analytic_Projects_Post_2015\2016_Steiner_Values_Affirmation_EX\Data\monthly recruitment pull\&sysdate9., token= *****, url= REDCap specific URL for your site);



Thank you!!