The following is an overview of software for the CMS-RXHCC risk-adjustment model. The software includes a SAS program – R0313L1P that calls several SAS Macros to create RXHCC score variables using coefficients from the following regression models:

1) Community, Non-Low Income, Aged, Continuing Enrollee
2) Community, Non-Low Income, Non-Aged,[1] Continuing Enrollee
3) Community, Low Income, Aged, Continuing Enrollee
4) Community, Low Income, Non-Aged, Continuing Enrollee
5) Institutional Continuing Enrollee
6) Community, Non-Low Income, New Enrollee
7) Community, Low Income, New Enrollee
8) Institutional New Enrollee

Software description

The software consists of a main program R0313L1P that supplies user parameters to the main SAS Macro program R0313L1M. This macro program reads in two input files and assigns RXHCCs for each person. First, the program crosswalks diagnoses to Condition Categories (RXCCs) using SAS formats which were previously stored in the FORMAT library. Then the program creates Drug Hierarchical Condition Categories (RXHCCs) by imposing hierarchies on the RXCCs. For persons without claims, zeros are assigned to all RXHCCs. A person may be assigned none, one, or more than one RXHCCs.
After RXHCCs are created, the program computes predicted scores from 8 regression models.
The main macro R0313L1M uses 6 external SAS Macro programs:

- %AGESEXV4 - create age/sex, originally disabled and non-aged variables
- %R03EDIT1 - perform edits to diagnosis
- %R02X78M2 - assign one ICD9 code to multiple RXCCs
- %R02X78L1 - assign labels to RXHCCs
- %R02X78H1 - set RXHCC=0 according to hierarchies
- %SCOREVAR - calculate a score variable

The main program, main macro and 6 external macros have a .txt extension to make the files easier to view. Please rename them to have .sas extension before running the software.

Steps performed by the software:

```
step1: include external macros
step2: define internal macro variables
step3: merge person and diagnosis files outputting one
       record per person for each input person level record
         step3.1: declaration section
         step3.2: bring in regression coefficients
         step3.3: merge person and diagnosis files
         step3.4: for the first record for a person set RXCCs to 0
                  and create person's age
         step3.5: if there are any diagnoses for a person
         then do the following:
```

[1] The term "non-aged" is used for those younger than 65 because this group includes beneficiaries eligible for Medicare because of end-stage renal disease as well as those eligible because of disability.

- create RXCCs using format specified in FMNAME (please see the **Files supplied by the software** section below for details on format library and formats specific to this version of software)
- perform ICD9 edits if wanted using macro R03EDIT1
- create additional RXCCs using R02X78M2 macro

step3.6: for the last record for a person do the following:

- create demographic variables needed for score calculation (macro AGESEXV4)
- create RXHCC using hierarchies (macro R02X78H1)
- create RXHCC by non-aged interaction variables
- set RXHCCs and interaction vars to zero if there are no diagnoses for a person
- create scores for 5 continuing enrollee models
- create scores for 3 new enrollee models

step4: data checks and proc contents

PART 1. Files supplied by the software.

The following SAS programs and files are included in this software:

R0313L1P – main program that has all the parameters supplied by a user (see below for parameter and variable list). It calls main macro R0313L1M.

R0313L1M - main macro that creates RXHCC and SCORE variables by calling other external macros.

AGESEXV4 - creates age/sex, originally disabled and non-aged variables.

R03EDIT1 - performs edits to ICD9 code if wanted. Medicare Code Editor (MCE) is source of edits.

R02X78M2 - assigns ICD9 diagnosis code to multiple RXCCs where required.

R02X78L1 - assigns labels to RXHCCs.

R02X78H1 - sets RXHCC=0 according to hierarchies.

SCOREVAR - calculates a score variable.

F0313R1R.TXT – a txt version of the format that has a cross-walk from ICD9 codes to RXCC categories (use for reference only). This format contains ICD9 codes valid in FY2012 or FY2013.

F0313R1R.TRN – format library containing all the formats for the software. Format names should be specified as main macro parameters in main program as follows:

I03131Y12Y13RX - version V03 cross-walk from ICD9 codes to RXCC categories that are transformed to RXHCC categories by the software -- contains ICD9 codes valid in FY2012 or FY2013. Format name should be specified in macro parameter **FMNAME**.

AGEY12Y13MCE - format to crosswalk ICD9 to acceptable age range in case edits on ICD9 are to be performed. Format name should be specified in macro parameter **AGEFMT.**

SEXY12Y13MCE - format to crosswalk ICD9 to acceptable sex in case edits on ICD9 are to be performed. Format name should be specified in macro parameter **SEXFMT.**

R0313L3R.TRN – relative coefficients for 8 regression models, created on CY2010/2011 data using the CMS denominator 1,182.35 (2/8/2013). The models were modified to reflect the reductions in beneficiary cost sharing in the coverage gap that will be in place in

2014, 28% to plan liability for non-applicable (generic) drugs and 2.5% to plan liability for applicable (brand) drugs in the coverage gap.

The last 2 files are SAS transport files and have the extension .trn. These transport files are special SAS files that may be used on any platform running SAS after uploading and converting using PROC CIMPORT. The user should use the following program to convert them.

Code for converting coefficients transport file to SAS file:

```
filename inc  "C:\user defined location of the transport file\R0313L3R.TRN";
libname incoef  "C:\user defined location of the sas coefficients file";
proc cimport data=incoef.rxcoeff infile=inc;
run;
```

Code for converting formats transport file to SAS file:

```
filename inf  "C:\user defined location of the transport file\F0313R1R.TRN";
libname library  "C:\user defined location of the sas formats file";
proc cimport library=library infile=inf;
run;
```

If you are operating in an MVS – z/OS environment, the transport files should be uploaded using the following parameters:

RECFM(F or FB) LRECL(80) BLKSIZE(8000)

PART 2. Files supplied by a user.

Two SAS input files needed for the software must be presorted in ascending order by the person ID variable

1) **PERSON** file--a person-level file of demographic and enrollment information
2) **DIAG** file--a diagnosis-level input file of diagnoses

Data requirements for the SAS input files. The variable names listed are required by the programs as written:

1) **PERSON** file

- **HICNO** (or other person identification variable. It must be set in the macro variable IDVAR)
  -character or numeric type and unique to an individual

- **SEX**
  -one character, 1=male; 2=female

- **DOB**
  -SAS date format, date of birth

- **OREC**
  -one character, original reason for entitlement with the following values:
  0 - OLD AGE (OASI)
  1 - DISABILITY (DIB)
  2 - ESRD
  3 - BOTH DIB AND ESRD

- **ESRD**
  -numeric, end stage renal disease indicator with the following values:
  0 – no ESRD
  1 – if person is in any of the following statuses: ESRD dialysis, transplant, post graft.

  ESRD variable is needed for New Enrollee models. If missing, the New Enrollee scores for the beneficiary will be missing. Set to 0 if not known to get the non-ESRD score, the most common situation.

2) **DIAG** file--a diagnosis file with at least one record per person-specific diagnosis.
   - **HICNO** (or other person identification variable that must be the same as in PERSON file)
     - person identifier of character or numeric type and unique to an individual

   - **DIAG**
     -ICD-9-CM diagnosis code, 5 character field, no periods, left justified. The user may include all diagnoses or limit the codes to those used by the model. Codes should be to the greatest level of available specificity. Diagnoses should be included **only** from providers and physician specialties allowable for risk adjustment reporting (as specified in CMS notices).

Part 3. Parameters supplied by a user:

The user must supply the following in the R0313L1P program:
- **INP** - SAS input person dataset name
- **IND** - SAS input diagnosis dataset name
- **OUTDATA** - SAS output dataset name
- **IDVAR –** variable name for Beneficiary ID (HICNO for Medicare data)
- **KEEPVAR** - variables kept in the output dataset. There is a list of KEEP variables in the program, but the user can alter the list.
- **SEDITS** - a switch that controls whether to perform edits on ICD9 1-YES, 0-NO
- **DATE_ASOF-** reference date to calculate age. Set to February 1 of the payment year for consistency with CMS.
- **FMNAME –** format name (crosswalk ICD9 to 78 V03 RxCC). For this version of the software it is ***I03131Y12Y13RX.***
- **AGEFMT –** format name (crosswalk ICD9 to acceptable age range in case edits on ICD9 are to be performed). For this version of the software it is ***AGEY12Y13MCE.***

- **SEXFMT** - format name (crosswalk ICD9 to acceptable sex in case edits on ICD9 are to be performed). For this version of the software it is ***SEXY12Y13MCE.***

Part 4. Variables outputted by the software.
The software outputs a person level file. Any variables that the user wants to keep in it should be specified in the main program **R0313L1P** in **KEEPVAR** parameter of macro **R0313L1M** call. The following variables can be specified:

1) Any person level variables from the original person level file

2) Demographic variables created by the software:
   AGEF ORIGDS NONAGED

   F0_34 F35_44 F45_54 F55_59 F60_64 F65_69
   F70_74 F75_79 F80_84 F85_89 F90_94 F95_GT
   M0_34 M35_44 M45_54 M55_59 M60_64 M65_69
   M70_74 M75_79 M80_84 M85_89 M90_94 M95_GT
   (these are age/sex variables for continuing enrollees defined in the main program **R0313L1P** by the macro variable **&AGESEXVARS**)

   NEF0_34 NEF35_44 NEF45_54 NEF55_59 NEF60_64
   NEF65 NEF66 NEF67 NEF68 NEF69
   NEF70_74 NEF75_79 NEF80_84 NEF85_89 NEF90_94
   NEF95_GT
   NEM0_34 NEM35_44 NEM45_54 NEM55_59 NEM60_64
   NEM65 NEM66 NEM67 NEM68 NEM69
   NEM70_74 NEM75_79 NEM80_84 NEM85_89 NEM90_94
   NEM95_GT
   (these are age/sex variables for new enrollees defined in the main program **R0313L1P** by the macro variable **&NEAGESEXVARS**)

3) **RXHCC**'s defined in the main program **R0313L1P** by the macro variable **&RXHCCV3_list78**

4) **RXCC**'s (condition categories assigned before hierarchies are applied) defined in the main program **R0313L1P** by the macro variable **&RXCCV3_list78**

5) Score variables:
   SCORE_CE_NonLowInc_Aged
   SCORE_CE_NonLowInc_NonAged
   SCORE_CE_LowInc_Aged
   SCORE_CE_LowInc_NonAged
   SCORE_CE_Institutional
   SCORE_NE_NonLowInc_Community
   SCORE_NE_LowInc_Community
   SCORE_NE_Institutional

The user should determine which of the scores is appropriate for the beneficiary depending upon the status of that beneficiary.