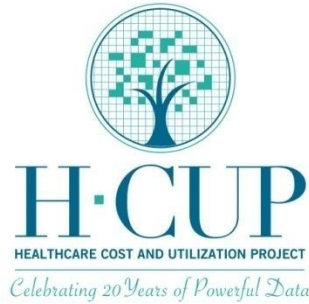


**MAINTAIN AND EXPAND  
THE HEALTHCARE COST AND UTILIZATION PROJECT (HCUP)  
Contract No. HHS-290-2006-00009-C**



**MAINTAIN TOOL DEVELOPMENT LOGISTICS MEMO FOR  
YEAR 5  
DELIVERABLE #165.04**

**THIS IS A REFERENCE DOCUMENT FOR AHRQ HCUP  
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## INTRODUCTION

The purpose of this document is two-fold: (a) to propose procedures and methods that will ensure accurate completion of the annual HCUP Tools update process, and (b) to document these procedures for future members of the Tools Team. The procedures referenced in this report apply only to the tools based on the ICD-9-CM, ICD-10-CM, CPT, or HCPCS coding systems.

The report is divided into two parts: the first consists of a discussion of fundamental conventions for version control, file naming, and file locations that will be observed throughout the tool update process. The second part proposes quality assurance (QA) procedures for the eight HCUP tools that are updated annually. Many of the methods suggested in the latter section were identified during the 2004-2011 tool updates. For new tools, our experience in testing similar software will be used as a basis for the QA recommendations. A list of files delivered to AHRQ via the HCUP-US Website can be found in Appendix A. Explicit file and program names used for each tool are presented in Appendix B.

## GENERAL QUALITY ASSURANCE STEPS

A critical dimension of ensuring tool quality is an organized file system that makes sense to all involved. This system should have a centralized storage area for all work, a common naming convention, and an easy-to-use version control system.

**File Location:** All tools will be stored under a master directory called “Tools” on the HCUP application server. This master directory will contain subdirectories for each tool, using abbreviations of the tool names (see Table A below). Under each tool subdirectory, folders will exist for the year of the tool update, and under the yearly folders there will be directories for documentation, code mapping, SAS files, production software, and testing software. For example, the CCS-Services and Procedures software will have a directory structure that contains:

- A root directory called Tools.
- A first subdirectory called CCS-Services and Procedures.
- Secondary subdirectories under CCS-Services and Procedures that denote the year of the tool update, in the form of yyyy.
- Final subdirectories under the yearly directories, called SAS, Mapping, Documentation, Pgms, Release, and Test.

The subdirectory called “SAS” will be for SAS files and output. The “Mapping” folder will contain the Excel spreadsheets produced by the coders that map the codes into tool categories. “Documentation” will house all documents relating to the tool that needs an annual update. The “Pgms” subdirectory will house any software used for the annual update. The “Release” folder will contain the final deliverable files that are to be uploaded to HCUP-US, and the “Test” folder will hold all testing and QA software.

**Table A**  
**Tool Abbreviations Used for Naming Conventions**

<b>Tool Abbreviation</b>	<b>Corresponding Tool Name</b>
CCS	Clinical Classification System for ICD-9-CM Diagnoses and Procedures
CCS ICD-10-CM	Clinical Classification System for ICD-10-CM Diagnoses and Procedures
CCS-Services and Procedures	Clinical Classification System for Services and Procedures
CCI	Chronic Condition Indicator Tool for ICD-9-CM
CCI ICD-10-CM	Chronic Condition Indicator Tool for ICD-10-CM
Comorb	Comorbidity Software ICD-9-CM
Comorb ICD-10-CM	Comorbidity Software ICD-10-CM
CCS ICD-10	Clinical Classification System for ICD-10 Mortality Codes
PC	Procedure Classes for ICD-9-CM
PC ICD-10-CM	Procedure Classes for ICD-10-CM

**File Naming:** Any SAS files used in the production of the yearly tool update will be named using the tool abbreviation first, followed by an underscore, and then a brief description of the file. For production, a file might be called CCS-services\_procedures\_Step1.sas, while for the testing of a file, the file name might be CCS-services\_procedures\_Test1.sas. The use of underscore characters should separate all descriptive elements in the file name.

**Version Control:** To ensure the unambiguous recording of each file version, its creation date (MDY) is appended to the tool-step portion of the file name. As an example, when noting a version of the CCS-Services and Procedures software, the file name might be: FY2006\_CCS\_services\_procedures102306.csv. Any revisions to files will require that a new version of the file be saved with an updated name using the current date.

As part of the annual tool update process, each tool is loaded into a SAS dataset for purposes of testing, updating, and manipulation. There can be multiple versions of these SAS files (during the same fiscal year) in cases where mid-year updates or corrections are required after the tool is released. The older versions of the tool are usually kept for comparison testing with the latest tool file in order to verify that the requested fixes, changes, and or deletions were made. As a result, they require version control as well, and should be appended with a “Vn” designation. The most current tool data files should not have any version designation in the name so that they match the automated SAS software used for building and testing. This process will help avoid updating the tools using old or bad versions of the data files and is especially applicable to mid-year updates or corrections.

**Quality assurance procedures for each tool**

Currently, five diagnosis and procedure code-based tools require annual updating:

- The Clinical Classification System (CCS, based on ICD-9-CM),
- Comorbidity software (based on ICD-9-CM),
- Procedure Classes (PC, based on ICD-9-CM),
- Chronic Condition Indicator (CCI, based on ICD-9-CM), and the
- CCS-Services and Procedures (based on CPT codes).

The four ICD-9-CM-based tools are currently being converted to ICD-10-CM codes:

- CCS for ICD-10-CM,
- Comorbidity tool for ICD-10-CM,
- Procedure Classes for ICD-10-CM, and the
- Chronic Condition Indicator for ICD-10-CM.

One tool, CCS-Mental Health and Substance Abuse (CCS-MHSA), has already been incorporated into the CCS for diagnoses and is no longer a separate entity. Another tool, the CCS ICD-10 for Mortality codes, is updated every 2-3 years per AHRQ request. A description of the quality assurance procedures for each of these tools is included in the following pages.

**CCS (ICD-9-CM, ICD-10-CM, ICD-10 [Mortality], Services and Procedures), Chronic Condition Indicator (CCI), and Procedure Classes (PC):** The series of steps described below will be used for the Procedure Classes, Chronic Condition Indicator, and each of the CCS tools because of the strong similarities in design characterizing these pieces of software. Each of the steps will ensure accurate updates for the tools above and will serve as an informational guide for uninitiated staff members who may need to perform tool updates in the future.

1. Experienced medical coders will start the update process by identifying new and discontinued ICD-10, ICD-10-CM, ICD-9-CM, CPT™, or HCPCS codes for a given tool. The coders will acquire this information either directly from the *Federal Register*, the World Health Organization (WHO), *the American Medical Association (AMA)*, or from commercially available software, such as Encoder Pro Professional© (a software application from Ingenix, Inc., that derives information from the *Federal Register*).
2. The coders will then create a spreadsheet that maps the newly discovered codes to the applicable CCS, CCI, or Procedure Classes categories. *If the budget allows, two coders will independently code the mappings and then compare their results so that a consensus mapping is reached. If this is not possible, only one coder will assign the codes to categories, while any additional coders will verify this work.* The coders will keep all codes in the spreadsheet, even if they are discontinued, so that the software can be used with prior years of data. In very rare circumstances, when a code is discontinued and then resurrected with a completely different meaning, the coders will make special arrangements to accommodate the changes.
3. The coders will send a draft copy of the spreadsheet to the Tools Task Leader to ensure that all facets of the mapping have been completely addressed. After this step has been completed, the spreadsheet will be sent to AHRQ for review and will be dated appropriately.

4. After the mapping spreadsheet is approved by AHRQ, a Thomson Reuters (TR) programmer will update the corresponding tool software and documentation. For the CCS ICD-9-CM tools, this may involve multiple pieces of software (i.e., single-level CCS and multi-level CCS). The TR programmer will date the software and documentation accordingly.
5. A TR Research Analyst will then perform a manual check to see that the updated software and documentation match the Excel mapping spreadsheet provided by the coders.
6. After the manual check is completed, a series of Quality Assurance tests will be performed on the revised tool software. In order to accomplish this, a given tool must be read into SAS and then converted to a SAS format (which is similar to a lookup table). The specific QA tests are described in detail below.
  - a. The first QA test will be to compare the updated software to a table of valid diagnosis or procedure codes, such as the Centers for Medicare and Medicaid Services (CMS) master table of diagnosis and procedure codes. A mismatch will identify invalid codes or codes that have been entered incorrectly and that require correction by the programmer. The second procedure will be a regression test. This test will involve comparing the current tool to the previous year's tool in SAS. The differences discovered should be the new codes added, or old codes removed, based on the findings of the coders. There should be no blank CCS categories or codes with CCS category of Missing at this stage.
  - b. A second regression test will compare the current tool with the previous year's tool using the Nationwide Inpatient Sample (NIS) or a State Ambulatory Surgery Database (SASD). Differences between the two versions of software will be discovered by running frequencies in SAS for each tool category, then comparing the categories across the two years. If codes have been added to a category, one would expect to see higher numbers in the frequency. *This test is superseded by the first regression test and is only performed in cases where extra information is required.*
  - c. The final test will involve loading the tool software into a SAS format and checking it against test data in the form of SAS cards or SAS data lines. These data will be test data, created specifically to ensure a desired result. For example, test data will be created that represents all of the new ICD-9-CM codes for the year. The software assigns these codes to the correct category specified in the spreadsheet created by the coders – an expected result. Invalid codes will also be tested, to see that they are assigned to the appropriate category. This step also includes a check for duplicate codes.

<b>Table B</b>	
<b>Example: CCS-SERVICES AND PROCEDURES Quality Assurance Program Flow</b>	
<b>Program Name</b>	<b>Testing Purpose</b>
CCS-services_procedures_Test_Master.sas	Compare the CCS-Services and Procedures with a master table of CPT and HCPCS procedure codes
CCS-services_procedures_Test_Regression.sas	Compare the current CCS-Services

	and Procedures tool with the previous year's tool
CCS-services_procedures_Test_Regression_NIS.sas	Use the SASD to compare the current CCS-Services and Procedures tool with the previous year's tool
CCS-services_procedures_QA.sas	Use test data and formats to verify the CCS-Services and Procedures tool

Range-checking is another quality assurance method that was used at one time but has been superseded by the methods described above. This process involved placing diagnosis or procedure codes from the completed software into ranges based on their numerical order. The test focused on codes that fell out of any range (single codes), and how they compared to the appropriate CCS or Procedure Classes category. Two major findings resulted from this analysis:

1. Grouping codes according to their numerical order did not correlate them to a given CCS category. Numerical order was not relevant for CCS mapping.
2. Problems with CCS mapping did not arise when single codes failed to fall into ranges.

**Comorbidity Software:** This tool is rather unique because it is composed of two components: a SAS program called “comformat” that builds a format to use as a lookup table, and an analytic program called “comoanaly” that applies the format to the data and creates the Comorbidity data elements. The format program is the most likely piece of the tool to be updated. The Comorbidity tool should be updated first, before the CCS tools, because an outside group relies on this tool for their vital research and ongoing software updates. The Comorbidity tool testing process involves the following five steps:

1. TR coders will start the process by identifying new ICD-9-CM and ICD-10-CM diagnosis, Diagnosis Related Group (DRG), and MS-DRG codes that will affect the Comorbidity software. The coders will use information either from the *Federal Register* or from commercially available software, such as Encoder Pro Professional© (a software application from Ingenix, Inc.).
2. TR coders will then create a spreadsheet specifying to which comorbidity format these new codes should adhere. This spreadsheet will be sent to AHRQ for review and will be dated accordingly.
3. A TR programmer will then update one or both of the Comorbidity software programs and documentation. The programmer will update the comments section of the software with details about the updates so that users can easily understand which comorbidities have changed.
4. A TR Research Analyst will check the format and analysis programs against the spreadsheet of proposed changes to ensure that no typographical errors exist and to verify that no code mismatches exist between the two documents.
5. The updated code will be run against a subset of the NIS to confirm that no errors were introduced during editing that might prevent its successful execution. The output file from

the NIS test will be compared to the previous year's NIS test file using SAS Proc Compare to verify the changes. The report generated by Proc Compare will outline in detail any differences between the two files; these differences should be directly related to the software updates.

## **CONCLUSION**

The procedures described in this document serve to increase the accuracy of the HCUP Tool updates and provide an easy-to-follow update plan for new team members. The standardization of naming, version control, and file locations will make the tools easy to find, control, and update, even by multiple parties. These procedures provide a strong foundation for software development. Add specific, well-tested QA procedures to this foundation, and the annual tool updates should be very reliable.



# **APPENDIX A**

## **HCUP-US TOOL FILE DELIVERABLES**

**APPENDIX A: HCUP-US TOOL FILE DELIVERABLES**

<b>Tool</b>	<b>File</b>	<b>Type</b>	<b>Creation Notes</b>
Single-Level CCS for ICD-9-CM	\$dxref [yyyy].csv	Tool	Programmatic
	dxlabel [yyyy].csv	Tool	Manual
	\$prref [yyyy].csv	Tool	Programmatic
	prlabel [yyyy].csv	Tool	Manual
	AppendixASingleDX.txt	Doc	Programmatic
	AppendixBSinglePR.txt	Doc	Programmatic
	ccs.jsp (Web page)	Doc	Manual
	CCSUsersGuide.pdf	Doc	Manual - PDF
	CCSCategorynames_FullLabels.pdf	Doc	Manual - PDF
	singleDXCCSLoad.do	Tool	Programmatic
	singleDXCCS.do	Tool	Programmatic
	singlePRCCSLoad.do	Tool	Programmatic
	singlePRCCS.do	Tool	Programmatic
	Readme_Single-Level Diagnosis CCS.doc	Doc	Manual
	Readme_Single-Level Procedure CCS.doc	Doc	Manual
Single-Level CCS for ICD-10-CM	ccs_dx_icd10cm_YYYY.csv	Tool	Programmatic
	ccs_pr_icd10cm_YYYY.csv	Tool	Programmatic
	dxlabel [yyyy].csv	Tool	Manual
	prlabel [yyyy].csv	Tool	Manual
	Ccs icd-10-cm.jsp (Web page)	Doc	Manual
	CCSUsersGuide.pdf	Doc	Manual - PDF
	CCSCategorynames_FullLabels.pdf	Doc	Manual - PDF

Tool	File	Type	Creation Notes
CCS_Multi (currently for ICD-9-CM)	ccs_multi_dx_tool_yyyy.csv	Tool	Programmatic
	ccs_multi_pr_tool_yyyy.csv	Tool	Programmatic
	Multi_CCS_Load_Program.sas	Tool	Manual
	Multi_CCS_Summary_Program.sas	Tool	Manual
	dxmlabel-yy.csv	Tool	Manual
	prmlabel-yy.csv	Tool	Manual
	AppendixCMultiDX.txt	Doc	Programmatic
	AppendixDMultiPR.txt	Doc	Programmatic
	ccs.jsp (Web page)	Doc	Manual
	MultiDXCCSLoad.do	Tool	Programmatic
	MultiDXCCS.do	Tool	Programmatic
	MultiPRCCSLoad.do	Tool	Programmatic
	MultiPRCCS.do	Tool	Programmatic
	Readme_Multi-Level Diagnosis CCS.doc	Doc	Manual
Readme_Multi-Level Procedure CCS.doc	Doc	Manual	
CCS_Multi (currently for ICD-9-CM)	ccs_multi_dx10_tool_yyyy.csv	Tool	Programmatic
	ccs_multi_pr_tool_yyyy.csv	Tool	Programmatic
	Multi_CCS10_Load_Program.sas	Tool	Programmatic
	Multi_CCS10_Summary_Program.sas	Tool	Programmatic
	dxmlabel-yy.csv	Tool	Programmatic
	prmlabel-yy.csv	Tool	Programmatic
	AppendixCMultiDX10.txt	Doc	Programmatic
	AppendixDMultiPR10.txt	Doc	Programmatic
	Ccs10.jsp (Web page)	Doc	Manual
CCS-Services and Procedures	Table 1 - CCS-Services and Procedures Procedure Categories	Doc	Manual

Tool	File	Type	Creation Notes
	fyyyyy_ccs_services_procedures.csv	Tool	Programmatic
	ccs_services_procedures_category_labels.csv	Tool	Manual
	ccs-svcproc.jsp (Web page)	Doc	Manual
	ccscpt_downloading.jsp (Web page)	Doc	Manual
	ccscpt_license.jsp (Web page)	Doc	Manual
	usgov.jsp (Web page)	Doc	Manual
CCS ICD-10 Mortality	ccs_icd10_yyyy.csv	Tool	Programmatic
	dxlabel yyyy.csv	Doc	Manual
	ccs_icd_10.jsp (Web page)	Doc	Manual
PC for ICD-9-CM	pcyyyy.csv	Tool	Programmatic
	procedure.jsp (Web page)	Doc	Manual
	PRclassLoad.do	Tool	Programmatic
	PRclass.do	Tool	Programmatic
	Readme_Procedure Class.doc	Doc	Manual
PC for ICD-10-CM	pc_icd10cm_yyyy.csv	Tool	Programmatic
	Pc10.jsp (Web page)	Doc	Manual
CCI for ICD-9-CM	CCI[yyyy].csv	Tool	Programmatic
	chronic.jsp (Web page)	Doc	Manual
	ChronicDXLoad.do	Tool	Programmatic
	ChronicDX.do	Tool	Programmatic
	Readme_Chronic Condition Indicator.doc	Doc	Manual
CCI for ICD-10-CM	CCI_icd10cm_[yyyy].csv	Tool	Programmatic
	Chronic10.jsp (Web page)	Doc	Manual

Tool	File	Type	Creation Notes
Comorb	Comformat[yyyy].txt	Tool	Manual
	Comoanaly[yyyy].txt	Tool	Manual
	Table1-FY[yyyy]-[Version].doc	Doc	Manual
	Table 2- FY[yyyy]-[Version].doc	Doc	Manual
	Comorbidity.jsp (Web page)	Doc	Manual
Comorb ICD-10-CM	Comformat_icd10cm_[yyyy].txt	Tool	Manual
	Comoanaly_icd10cm_[yyyy].txt	Tool	Manual
	Table1-icd10cm-FY[yyyy]-[Version].doc	Doc	Manual
	Table 2- icd10cm-FY[yyyy]-[Version].doc	Doc	Manual

**~~APPENDIX B~~**

**~~EXACT FILE, WEBSITE, AND PROGRAM NAMES FOR  
EACH TOOL~~**

## APPENDIX B: EXACT FILE, WEBSITE, AND PROGRAM NAMES FOR EACH TOOL

### CCS for ICD-9-CM and ICD-10-CM:

#### *Step 1: Obtain New Codes*

<http://www.gpoaccess.gov/fr/>: This Website contains the annual government updates to the ICD-9-CM and ICD-10-CM codes, as published in the *Federal Register*. This Web resource is utilized in Step 1 of the CCS update process.

<http://www.ingenixonline.com/>: The Encoder Pro software is used to identify new or discontinued ICD-9-CM and ICD-10-CM codes for the CCS tools. This Website is utilized in Step 1 of the CCS update process.

#### *Step 2: Update Mappings*

These files contain updated mappings of ICD-9-CM and ICD-10-CM diagnosis and procedure codes to CCS categories for fiscal year yyyy. The files are created in Step 2 of the CCS update process. The ICD-9-CM files located at <\\thuscasanapp25\lun0\tools\ccs\yyyy\mapping> are called:

- [FYyyyy\\_ccs\\_dx\\_revisions.xls](#)
- [FYyyyy\\_ccs\\_pr\\_revisions.xls](#)

The ICD-10-CM files are located at <\\thuscasanapp25\lun0\tools\ccs\icd-10-cm\yyyy\mapping> are called:

- [FYyyyy\\_ccs\\_dx10\\_revisions.xls](#)
- [FYyyyy\\_ccs\\_pr10\\_revisions.xls](#)

#### *Step 3: Update Software and Documentation*

##### **Single-level Diagnosis CCS Tools:**

These CCS tools are text files that are updated based on the spreadsheets generated in Step 2. Yyyy represents the year being updated.

- *ICD-9-CM: \$dxref YYY.csv* is updated using a series of SAS programs. These SAS programs are located in [ccs\pgms\CCS\\_Single\DX\](#) directory. The order in which these programs are executed is indicated by program names that include the terms *step1*, *step2*, etc.
- *ICD-10-CM: ccs\_dx\_icd10cm\_YYY.csv* is updated using a series of SAS programs. These SAS programs are located in [ccs\icd-10-cm\pgms\dx\](#) directory. The order in which these programs are executed is indicated by program names that include the terms *step1*, *step2*, etc.
- *dxlabel YYY.csv* is usually updated manually by exporting some or all columns from an Excel sheet (provided by the coder) into a CSV file. This file should be the same for both versions of ICD codes.
- The CCS ICD-9-CM tool for diagnoses is located at [\\thuscasanapp25\lun0\tools\ccs\yyyy\pgms\ccs\\_single\DX](\\thuscasanapp25\lun0\tools\ccs\yyyy\pgms\ccs_single\DX).
- The CCS ICD-10-CM tool for diagnoses is located at <\\thuscasanapp25\lun0\tools\ccs\icd-10-cm\yyyy\pgms\dx>.

### Single-level Procedure CCS Tools:

These CCS tools are text files that are updated based on the spreadsheets generated in Step 2. Yyyy represents the year being updated.

- ~~ICD-9-CM: \$prref YYYYY.csv is updated using a series of SAS programs. These SAS programs are located in ccs\pgms\CCS\_Single\PR directory. The order in which these programs are executed is indicated by program names that include the terms step1, step2, etc.~~
- ~~ICD-10-CM: ccs\_pr\_icd10cm\_YYYY.csv is updated using a series of SAS programs. These SAS programs are located in ccs icd-10-cm\pgms\pr\ directory. The order in which these programs are executed is indicated by program names that include the terms step1, step2, etc.~~
- ~~prlabel YYYYY.csv is usually updated manually by exporting some or all columns from an Excel sheet (provided by the coder) into a CSV file. This file should be the same for both versions of ICD codes.~~
- ~~The CCS ICD-9-CM tool for procedures is located at \\thuscasanapp25\lun0\tools\ccs\yyyy\pgms\ccs\_single\PR\.~~
- ~~The CCS ICD-10-CM tool for procedures is located at \\thuscasanapp25\lun0\tools\ccs icd-10-cm\yyyy\pgms\pr\.~~

### Multi-level CCS Tools:

These are the multi-level diagnosis and procedure files that are updated using the spreadsheets in Step 2. Steps to update these files are similar to the steps for the single-level programs above. Yyyy represents the year being updated. A text editor performs the updates to avoid any Excel conversion issues.

- ~~The ICD-9-CM programs are located in the directory \\thuscasanapp25\lun0\tools\ccs\yyyy\pgms\ccs\_multi\dx or pr.~~
- ~~The ICD-10-CM programs are located in the directory \\thuscasanapp25\lun0\tools\ccs icd-10-cm\yyyy\pgms\ccs\_multi\dx or pr.~~

The files ICD-9-CM files are:

- ~~ccs\_multi\_dx\_tool\_yyyy.csv~~
- ~~ccs\_multi\_pr\_tool\_yyyy.csv~~
- ~~dxmlabel-yy.csv~~
- ~~prmlabel-yy.csv~~

The files ICD-10-CM files are:

- ~~ccs\_multi\_dx10\_tool\_yyyy.csv~~
- ~~ccs\_multi\_pr10\_tool\_yyyy.csv~~
- ~~dxmlabel-yy.csv~~
- ~~prmlabel-yy.csv~~

### SAS Programs:

In addition to the multi-level tool files, two SAS programs are provided as utilities. These programs help users load the tool files and run summary statistics on the files.

- ~~The ICD-9-CM programs are located at: \\thuscasanapp25\lun0\tools\ccs\yyyy\pgms\ccs\_multi\public software\.~~
- ~~The ICD-10-CM programs are located at: \\thuscasanapp25\lun0\tools\ccs icd-10-cm\yyyy\pgms\ccs\_multi\public software\.~~



The ICD-9-CM files include:

- ~~Multi\_ccs\_load\_program.sas~~
- ~~Multi\_ccs\_summary\_program.sas~~

The ICD-10-CM files include:

- ~~Multi\_ccs10\_load\_program.sas~~
- ~~Multi\_ccs10\_summary\_program.sas~~

### **STATA Programs:**

Static programs that load single-level and multi-level CCS categories into STATA datasets are now available for public users of the ICD-9-CM CCS, thus eliminating the need for the project to create special STATA data files each year. As of October 2009, STATA load programs were developed to load the tool files into STATA format using the ASCII version of the tool files. STATA analysis programs continue to be provided so that users can then apply their STATA tool dataset to their data. This new approach will save much time and effort as STATA data files no longer need to be created and tested by HCUP each year. The programs are kept under the \\thuscasanapp25\lun0\tools\ccs\yyyy\stata\ directory. For each tool, two programs are provided as well as a readme document. The file names are in the following format:

- ~~SingleDXCCSLoad.do~~
- ~~SingleDXCCS.do~~
- ~~Readme\_Single-Level-Diagnosis-CCS.doc~~

The following documents show which diagnosis and procedure codes are associated with a given CCS single-level or multi-level category, list the names for a given CCS category, or provide an overview of the CCS tool.

- ~~The ICD-9-CM files are located in the directory \\thuscasanapp25\lun0\tools\ccs\yyyy\documentation\. The appendices are created by a series of SAS programs in the pgms\documentation directory. The documentation files are:~~
  - ~~AppendixA-single-DX-yyyy.txt~~
  - ~~AppendixB-single-PR-yyyy.txt~~
  - ~~AppendixC-multi-DX-yyyy.txt~~
  - ~~AppendixD-multi-PR-yyyy.txt~~
  - ~~CCS\_YYYY.doc~~
  - ~~CCSfactsheet.doc~~
  - ~~CCS-Category-Names-(Full-Labels).xls~~
  - ~~CCSUsersGuide.doc~~
- ~~The ICD-10-CM files are located in the directory \\thuscasanapp25\lun0\tools\ccs\icd-10-cm\yyyy\documentation\. The appendices are created by a series of SAS programs in the pgms\documentation directory. The documentation files are:~~
  - ~~AppendixA-single-DX10-yyyy.txt~~
  - ~~AppendixB-single-PR10-yyyy.txt~~
  - ~~AppendixC-multi-DX10-yyyy.txt~~
  - ~~AppendixD-multi-PR10-yyyy.txt~~
  - ~~CCS10\_YYYY.doc~~
  - ~~CCSfactsheet.doc~~
  - ~~CCS-Category-Names-(Full-Labels).xls~~
  - ~~CCSUsersGuide.doc~~

**Step 4: Manual Check of Software**

— A TR Research Analyst will verify the programs and documentation in Step 3 with  
— the Excel table of Revised Mappings in Step 2. The Analyst will notify task  
— personnel of any problems discovered.

**Step 5: Run Software QA Checks**

All CCS tools will be loaded into SAS and converted into SAS formats by the programmer.

- The formats for ICD-9-CM will be kept in the \\thuscasanapp25\lun0\tools\ccs\yyyy\sas\ directory.
- The formats for ICD-10-CM will be kept in the \\thuscasanapp25\lun0\tools\ccs\icd-10-cm\yyyy\sas\ directory.

**A: Compare To Master Table:** The following programs are used to compare diagnosis and procedure codes from the updated CCS files with the latest HCUP and CMS master tables of diagnoses and procedures.

- The ICD-9-CM test programs are located in the directory \\thuscasanapp25\lun0\tools\ccs\yyyy\test\master\.
- The ICD-10-CM test programs are located in the directory \\thuscasanapp25\lun0\tools\ccs\icd-10-cm\yyyy\test\master\.

The ICD-9-CM test programs include:

- ccs\_test\_master\_single\_pr.sas
- ccs\_test\_master\_single\_dx.sas
- ccs\_test\_master\_multi\_pr.sas
- ccs\_test\_master\_multi\_dx.sas

The ICD-10-CM test programs include:

- ccs\_test\_master\_single\_pr10.sas
- ccs\_test\_master\_single\_dx10.sas
- ccs\_test\_master\_multi\_pr10.sas
- ccs\_test\_master\_multi\_dx10.sas

The latest CMS master tables are loaded into SAS by the programmer and then converted into SAS formats. This work will be done in the \test\master\ directory. The files are located at \\thuscasanfs02\tsh\hpr\hcup5\processing\dx & pr codes\.

The ICD-9-CM files for 2011 are called:

- CMS28\_DESC\_SHORT\_DX.TXT
- CMS28\_DESC\_SHORT\_SG.TXT

The ICD-10-CM files for 2011 are called:

- ICD\_10\_DX\_2001\_SHORT.txt
- ICD\_10\_PCS\_2011\_SHORT.txt

The HCUP master tables of diagnoses and procedures are SAS formats. The latest HCUP master tables are located at \\thuscasanapp23\lun0\shared\master\formats\yyyy\. The ICD-9-CM formats are called:

- ~~\$dx\_ver~~
- ~~\$pr\_ver~~

The ICD-10-CM formats have yet to be created.

**B: Regression Test:** The following programs are employed to regression test the CCS tool with the CCS tool from the previous year.

- ~~The ICD-9-CM programs will be located in the directory \\thuscasanapp25\lun0\tools\ccs\yyyy\test\regression\.~~
- ~~The ICD-10-CM programs will be located in the directory \\thuscasanapp25\lun0\tools\ccs icd-10-cm\yyyy\test\regression\.~~

The ICD-9-CM single-level programs are located in the subdirectory called CCS\_Single. These programs are:

- ~~ccs\_test\_regression\_single\_pr.sas~~
- ~~ccs\_test\_regression\_single\_dx.sas~~

The ICD-10-CM programs are:

- ~~ccs\_test\_regression\_single\_pr10.sas~~
- ~~ccs\_test\_regression\_single\_dx10.sas~~

The multi-level programs are located in the subdirectory called CCS\_Multi.

The ICD-9-CM programs are:

- ~~ccs\_test\_regression\_multi3\_dx.sas~~
- ~~ccs\_test\_regression\_multi3\_pr.sas~~
- ~~ccs\_test\_regression\_multi4\_dx.sas~~

The ICD-10-CM programs are:

- ~~ccs\_test\_regression\_multi3\_dx10.sas~~
- ~~ccs\_test\_regression\_multi3\_pr10.sas~~
- ~~ccs\_test\_regression\_multi4\_dx10.sas~~

**C: NIS Comparison Test:** This test is only performed when additional information is needed.

- ~~The ICD-9-CM programs for this test can be found in the directory \\thuscasanapp25\lun0\tools\ccs\yyyy\test\nis\.~~
- ~~The ICD-10-CM programs for this test are found in the directory \\thuscasanapp25\lun0\tools\ccs icd-10-cm\yyyy\test\nis\.~~

The ICD-9-CM files are:

- ~~ccs\_test\_nis\_single\_dx.sas~~
- ~~ccs\_test\_nis\_single\_pr.sas~~
- ~~ccs\_test\_nis\_multi\_dx.sas~~
- ~~ccs\_test\_nis\_multi\_pr.sas~~

The ICD-10-CM files are:

- ~~ccs\_test\_nis\_single\_dx10.sas~~
- ~~ccs\_test\_nis\_single\_pr10.sas~~
- ~~ccs\_test\_nis\_multi\_dx10.sas~~
- ~~ccs\_test\_nis\_multi\_pr10.sas~~

~~A subset of the latest NIS file can be used for this test. The NIS core file is located at \\thuscasanapp25\lun0\nis\yyyy\sasdata\nis\_yyyy\_core.sas7bdat.~~

~~**D: QA Test:** This check involves first loading each tool file into a SAS format to make sure that it loads correctly. A data test of the format is then performed by creating a dataset using SAS Cards and applying the format. Duplicate codes and categories with missing values are also reported in this test.~~

- ~~The ICD-9-CM programs will be located in the directory \\thuscasanapp25\lun0\tools\ccs\yyyy\test\qa\.~~
- ~~The ICD-10-CM programs will be located in the directory \\thuscasanapp25\lun0\tools\ccs icd-10-cm\yyyy\test\qa\.~~

The ICD-9-CM programs include:

- ~~ccs\_QA\_single\_dx.sas~~
- ~~ccs\_QA\_single\_pr.sas~~
- ~~ccs\_QA\_multi\_dx.sas~~
- ~~ccs\_QA\_multi\_pr.sas~~

The ICD-10-CM programs include:

- ~~ccs\_QA\_single\_dx10.sas~~
- ~~ccs\_QA\_single\_pr10.sas~~
- ~~ccs\_QA\_multi\_dx10.sas~~
- ~~ccs\_QA\_multi\_pr10.sas~~

## **CCS-SERVICES AND PROCEDURES:**

### ***Step 1: Obtain New Codes***

~~TR coders will obtain new and discontinued CPT and HCPCS codes from the AHRQ CPT files licensed from the American Medical Association (AMA) as well as from CMS.~~

### ***Step 2: Update Mappings***

~~A single Excel file contains the updated mappings of CPT/HCPCS procedure codes into CCS categories for fiscal year yyyy. This file also contains the mappings of CPT/HCPCS procedure codes into body systems (ICD-9-CM procedure chapters). The file is created in Step 2 of the CCS-SERVICES AND PROCEDURES update process and is located at \\thuscasanapp25\lun0\tools\CCS-Services and Procedures\yyyy\mapping\. The file is called:~~

~~FYyyyy\_CCS-Services and Procedures\_revisions.xls~~

### ***Step 3: Update Software and Documentation***

~~These programs use the updated spreadsheet generated in Step 2 to create a tool file in CSV format under the SAS directory. A series of SAS programs perform the updates to avoid any data entry mistakes or omissions. The first program imports the Excel spreadsheet, and the second program creates the CSV tool in a format that is approved by the AMA. Labels for CPT codes are not allowed in the tool, but labels for HCPCS~~

codes are acceptable. CPT codes must be put in ranges, whenever possible. The programs are located at \\thuscasanapp25\lun0\tools\CCS-Services and Procedures\yyyy\pgms\. They include:

step0\_add\_ccs\_label\_ccssvc.sas

— step1\_build\_ccs\_services\_procedures\_master.sas

— step2\_build\_ccs\_services\_procedures\_tool.sas

— The output tool file created by the programs is located at

\\thuscasanapp25\lun0\tools\CCS-Services and Procedures\yyyy\sas\tool\. It is called:

— fyyyy\_ccs\_services\_procedures.csv

ccs\_services\_procedures\_category\_labels.csv

The documentation for the **CCS-SERVICES AND PROCEDURES** is comprised of several Web pages in Word format. Ccssvcproc.doc provides the overview, description, assignment methodology, categories, and links for the tool. The other documents are required for the **CCS-SERVICES AND PROCEDURES** licensing agreement and downloading. These documents are located in the directory \\thuscasanapp25\lun0\tools\CCS-Services and Procedures\yyyy\documentation\. The files are:

ccssvcproc.doc

ccscept\_downloading.doc

ccscept\_license.doc

usgovt.doc

#### **Step 4: Manual Check of Software**

— A TR Research Analyst will verify the programs and documentation in Step 3 with the Excel table of Revised Mappings in Step 2. The Analyst will notify task personnel of any problems discovered.

#### **Step 5: Run Software QA Checks**

— The **CCS-SERVICES AND PROCEDURES** tool will be loaded into SAS and converted into a SAS format by the programmer. The format will be kept in the \\thuscasanapp25\lun0\tools\CCS-Services and Procedures\yyyy\sas\ directory.

**A: Compare To Master Table:** The following program is used to compare the CPT and HCPCS codes from the updated **CCS-SERVICES AND PROCEDURES** tool file with the HCUP master tables of CPT and HCPCS procedures.

The compare program is located in the directory \\thuscasanapp25\lun0\tools\CCS-Services and Procedures\yyyy\test\master\. The program is called:

ccs\_services\_procedures\_test\_master.sas

The HCUP master tables of CPT and HCPCS codes are in a SAS format library located at \\thuscasanapp23\lun0\shared\master\formats\yyyy\. Yyyy represents the most current year for the CPT and HCPCS master table. The formats are:

\$cptfmt

\$hpcps

**B: Regression Test:** The following program is employed to regression test the **CCS-SERVICES AND PROCEDURES** tool with the tool from the previous year. The file is located in the directory \\thuscasanapp25\lun0\tools\CCS-Services and Procedures\yyyy\test\regression\. The program is called:

~~ccs-services\_procedures\_test\_regression.sas~~

~~**C: NIS Comparison Test:** This test is not performed for the CCS-SERVICES AND PROCEDURES because the tool is relatively new. Thus, existing databases do not contain CCS-SERVICES AND PROCEDURES categories.~~

~~**D: QA Test:** This check involves first loading the tool file into a SAS format to make sure that it loads correctly. A data test of the format is then performed by creating a dataset using SAS Cards and applying the format. Duplicate codes and categories with missing values are also reported in this test. This program is located in the directory \\thuscasanapp25\lun0\tools\CCS-Services and Procedures\yyyy\test\qa\. The program is called:~~

~~CCS-Services and Procedures\_QA.sas~~

### **CCS ICD-10 (Mortality):**

#### **Step 1: Obtain New Codes**

~~[http://www2.fhs.usyd.edu.au/ncch/WHO%20URC/who\\_urc.html#WHO\\_Off\\_Updates:](http://www2.fhs.usyd.edu.au/ncch/WHO%20URC/who_urc.html#WHO_Off_Updates) This Website contains the World Health Organization (WHO) updates to the ICD-10 diagnosis codes. This Web resource is utilized in Step 1 of the ICD-10 update process.~~

#### **Step 2: Update Mappings**

~~One file contains the updated mappings of ICD-10 diagnosis codes to CCS categories for fiscal year yyyy. The file is created in Step 2 of the ICD-10 update process and is located at \\thuscasanapp25\lun0\tools\ccs-icd-10\yyyy\mapping\. The file is called:~~

~~FYyyyy\_ccs-icd10\_revisions.xls~~

#### **Step 3: Update Software and Documentation**

~~The following CSV file is created using the spreadsheet in Step 2 and constitutes the CCS ICD-10 tool. It is located in the SAS directory. A text editor performs the updates to avoid any Excel conversion issues. The file can be found at~~

~~\\thuscasanapp25\lun0\tools\ccs-icd-10\yyyy\sas\tool\. The file name is:  
ccs\_icd10\_yyyy.csv~~

~~The documentation for the ICD-10 consists of one Web page that describes CCS ICD-10, the time period covered by CCS ICD-10, the representation of ICD-10 diagnosis codes in the tool, how to use the tool, references, contact information, and links for downloading the tool file/CCS User's Guide/CCS category labels. This document is located in the directory \\thuscasanapp25\lun0\tools\ccs-icd-10\yyyy\documentation\. The file is called:  
ccs-icd10.doc~~

#### **Step 4: Manual Check of Software**

~~A TR Research Assistant will verify the programs and documentation in Step 3 with the Excel table of Revised Mappings in Step 2. The Research Assistant will notify project personnel of any problems discovered.~~

#### **Step 5: Run Software QA Checks**

~~The ICD-10 tool will be loaded into SAS and converted into a SAS format by the programmer. The format will be kept in the \\thuscasanapp25\lun0\tools\ccs-icd-10\yyyy\sas\ directory.~~

**A: Compare To Master Table:** The following program is used to compare ICD-10 diagnosis codes from the ICD-10 CCS tool with the master table of ICD-10 diagnosis codes. A master table of ICD-10 codes can be obtained from the following Website for this test: <http://www.nzhis.govt.nz/documentation/mapping/mappingfiles.html>. The table to be used is the one-to-one backwards mapping of ICD-9 to ICD-10 codes.

The test program is located in the directory <\\thuscasanapp25\lun0\tools\ccs-icd-10\yyyy\test\master>. The program is called: `icd-10_test_master.sas`

The ICD-10 master table is loaded into SAS by the programmer and then converted into a SAS format. This work will be done in the `\test\master` directory. The latest ICD-10 master table is located at: <\\thuscasanapp25\lun0\tools\ccs-icd-10\yyyy\icd-10-master.xls>.

**B: Regression Test:** The following program is employed to regression test the ICD-10 tool with the tool from the previous year. The program is stored in the directory <\\thuscasanapp25\lun0\tools\ccs-icd-10\yyyy\test\regression>. The program is: `icd-10_test_regression.sas`

**C: NIS Comparison Test:** This test is not performed for the ICD-10 for any database because the tool is new. Thus, existing databases do not contain ICD-10 CCS categories.

**D: QA Test:** This check involves first loading the tool file into a SAS format to make sure that it loads correctly. A data test of the format is then performed by creating a dataset using SAS Cards and applying the format. Duplicate codes and categories with missing values are also reported in this test. All programs can be found in the directory <\\thuscasanapp25\lun0\tools\ccs-icd-10\yyyy\test\qa>. These programs include: `icd-10_QA.sas`

## **Procedure Classes (PC ICD-9-CM and PC ICD-10-CM):**

### **Step 1: Obtain New Codes**

<http://www.gpoaccess.gov/fr/>: This Website contains the annual government updates to the ICD-9-CM and ICD-10-CM procedure codes, as published in the *Federal Register*. This Web resource is utilized in Step 1 of the PC update process.

<http://www.ingenixonline.com>: The Encoder Pro software is used to identify new or discontinued ICD-9-CM codes for the PC tools. This Website is utilized in Step 1 of the PC update process.

### **Step 2: Update Mappings**

One file each contains the updated mappings of ICD-9-CM and ICD-10-CM procedure codes to PC categories for fiscal year yyyy. Each file is created in Step 2 of the PC update process.

- The ICD-9-CM file is located at <\\thuscasanapp25\lun0\tools\pc\yyyy\mapping> and is called: `FYyyyy_pc_revisions.xls`
- The ICD-10-CM file is located at <thuscasanapp25\lun0\tools\pc-icd-10-cm\yyyy\mapping>. The file is called: `FYyyyy_pc10_revisions.xls`

### **Step 3: Update Software and Documentation**

One Procedure Classes CSV file is updated manually using the spreadsheet generated in Step 2 of the process. A text editor performs the updates to avoid any Excel conversion issues.

- The ICD-9-CM file is stored under the directory \\thuscasanapp25\lun0\tools\pc\yyyy\sas\tool\. It is called: pc\_yyyy.csv
- The ICD-10-CM file is stored under the directory \\thuscasanapp25\lun0\tools\pc icd-10-cm\yyyy\sas\tool\. It is called: pc10\_yyyy.csv

The documentation for the PC tool consists of the HTML text for the Web page. The Web page describes the tool and explains how to use the software.

- For ICD-9-CM, the document is located in the directory \\thuscasanapp25\lun0\tools\pc\yyyy\documentation\. The file is: pc\_yyyy.doc
- For ICD-10-CM, the document is located in the directory \\thuscasanapp25\lun0\tools\pc icd-10-cm\yyyy\documentation\. The file is: pc10\_yyyy.doc

### **STATA Programs:**

A static program that loads the Procedure Classes into a STATA dataset is now available for public users of the ICD-9-CM tool, thus eliminating the need for the project to create a special STATA data file each year. A STATA analysis program continues to be provided for Procedure Classes so that users can also apply their STATA tool dataset to their data. This new approach will save much time and effort as the STATA data file no longer needs to be created and tested by HCUP each year. The programs are kept under the \\thuscasanapp25\lun0\tools\pc\yyyy\stata\ directory. For the PC tool, two programs are provided as well as a readme document. The file names are in the following format:

- PRclassLoad.do
- PRclass.do
- Readme\_Procedure Class.doc

### **Step 4: Manual Check of Software**

A TR Research Analyst will verify the programs and documentation in Step 3 with the Excel table of Revised Mappings in Step 2. The Analyst will notify project personnel of any problems discovered.

### **Step 5: Run Software QA Checks**

The PC tool will be loaded into SAS and converted into a SAS format by the programmer.

- The ICD-9-CM format will be kept in the \\thuscasanapp25\lun0\tools\pc\yyyy\sas\ directory.
- The ICD-10-CM format will be kept in the \\thuscasanapp25\lun0\tools\pc icd-10-cm\yyyy\sas\ directory.

**A: Compare To Master Table:** The following program is used to compare procedure codes from the PC tool with the HCUP and CMS master tables of procedure codes.



- The ICD-9-CM compare program is located in the directory \\thuscasanapp25\lun0\tools\pc\yyyy\test\master\. The file is called: pc\_test\_master.sas
- The ICD-10-CM compare program is located in the directory \\thuscasanapp25\lun0\tools\pc-icd-10-cm\yyyy\test\master\. This file is called pc10\_test\_master.sas

The latest CMS master table of procedures is loaded into SAS by the programmer and then converted into a SAS format. This work will be done in the \test\master\ directory. The file is located at \\thuscasanfs02\tsh\hpr\hcup5\processing\dx & pr codes\icd9-cm\FYyyyy\. The 2007 file is called: CMS27\_DESC\_SHORT\_SG.TXT

The HCUP master table of procedures is a SAS format. The latest HCUP master table is located at: \\thuscasanapp23\lun0\shared\master\formats\yyyy\. The format is called: \$pr\_ver

**B: Regression Test:** The following program is employed to regression test the PC tool with the tool from the previous year. It is stored in the directory \\thuscasanapp25\lun0\tools\pc\yyyy\test\regression\. It is called: pc\_test\_master.sas

———— **C: NIS Comparison Test:** This test is performed on the Procedure Classes tool when more information is needed. The directory for the test software is \\thuscasanapp25\lun0\tools\pc\yyyy\test\sasdata\.

———— A subset of the latest NIS file can be used for this test. The NIS core file is located at \\thuscasanapp25\lun0\nis\yyyy\sasdata\nis\_yyyy\_core.sas7bdat.

**D: QA Test:** This check involves first loading the tool file into a SAS format to make sure that it loads correctly. A data test of the format is then performed by creating a dataset using SAS Cards and applying the format. Duplicate codes and categories with missing values are also reported in this test. The program can be found in the directory \\thuscasanapp25\lun0\tools\pc\yyyy\test\qa\. The program is: PC\_QA.sas

### **CCS-MHSA:**

The CCS-MHSA is no longer a separate tool that needs annual updating. The codes and categories in the CCS-MHSA tool have been incorporated into the single-level CCS tool for diagnoses.

### **Chronic Condition Indicator (CCI ICD-9-CM and CCI ICD-10-CM):**

#### **Step 1: Obtain New Codes**

http://www.gpoaccess.gov/fr/: This Website contains the annual government updates to the ICD-9-CM and ICD-10-CM diagnosis codes, as published in the *Federal Register*. This Web resource is utilized in Step 1 of the CCI update process.

http://www.ingenixonline.com: The Encoder Pro software is used to identify new or discontinued ICD-9-CM and ICD-10-CM diagnosis codes for the CCI tools. This Website is utilized in Step 1 of the CCI update process.

#### **Step 2: Update Mappings**

One file each contains the updated mappings of ICD-9-CM and ICD-10-CM diagnosis codes to CCI categories for fiscal year yyyy. Each file is created in Step 2 of the CCI update process.

- The ICD-9-CM mapping file is found at \\thuscasanapp25\lun0\tools\CCI\yyyy\mapping\.
- The ICD-10-CM mapping file is found at \\thuscasanapp25\lun0\tools\CCI\icd-190-cm\yyyy\mapping\.
- The file ICD-9-CM file is: FYyyyy\_cci\_revisions.xls
- The file ICD-10-CM file is: FYyyyy\_cci10\_revisions.xls

### **Step 3: Update Software and Documentation**

One Chronic/Non-Chronic CSV file is updated manually using the spreadsheet in Step 2 of the process. A text editor performs the updates to avoid any Excel conversion problems.

- For ICD-9-CM, this file is stored under the directory \\thuscasanapp25\lun0\tools\CCI\yyyy\sas\tool\. It is called: cciyyyy.csv
- For ICD-10-CM, this file is stored under the directory \\thuscasanapp25\lun0\tools\CCI\icd-10-cm\yyyy\sas\tool\. It is called: cci10yyyy.csv

The documentation for each CCI tool consists of HTML text for the Web page. Each Web page describes the tool and explains how to use the software. Each also includes an appendix that shows which ICD-9-CM or ICD-10-CM codes are mapped as chronic and which are non-chronic, and the relationship of the codes to body categories.

- For the ICD-9-CM, this document is located in the directory \\thuscasanapp25\lun0\tools\CCI\yyyy\documentation\. The file is called: cci\_yyyy.doc
- For the ICD-10-CM, this document is located in the directory \\thuscasanapp25\lun0\tools\CCI\icd-10-cm\yyyy\documentation\. The file is called: cc10i\_yyyy.doc

### **STATA Programs:**

A static program that loads the Chronic Condition Indicator into a STATA dataset is available for public users of the ICD-9-CM tool, thus eliminating the need for the project to create a special STATA data file each year. A STATA analysis program continues to be provided for Chronic Condition Indicator so that users can also apply their STATA tool dataset to their data. This new approach will save much time and effort as the STATA data file no longer needs to be created and tested by HCUP each year. The programs are kept under the \\thuscasanapp25\lun0\tools\cci\yyyy\stata\ directory. For the CCI tool, two programs are provided as well as a readme document. The file names are in the following format:

- ChronicDXLoad.de
- ChronicDX.de
- Readme\_Chronic Condition Indicator.doc

### **Step 4: Manual Check of Software**

— A TR Research Assistant will verify the programs and documentation in Step 3 with the Excel table of Revised Mappings in Step 2. The Research Assistant will notify project personnel of any problems discovered.

**Step 5: Run Software QA Checks**

— The CCI tools will be loaded into SAS and converted into SAS formats by the programmer.

- The ICD-9-CM format will be kept in the \\thuscasanapp25\lun0\tools\CCI\yyyy\sas\ directory.
- The ICD-10-CM format will be kept in the \\thuscasanapp25\lun0\tools\CCI\icd-10-cm\yyyy\sas\ directory.

**A: Compare To Master Table:** The following programs are used to compare ICD-9-CM and ICD-10-CM diagnosis codes from the CCI tools with the HCUP and CMS master tables of ICD-9-CM and ICD-10-CM diagnosis codes.

- The ICD-9-CM program is located in the directory \\thuscasanapp25\lun0\tools\CCI\yyyy\test\master\.
- The ICD-10-CM program is located in the directory \\thuscasanapp25\lun0\tools\CCI\icd-10-cm\yyyy\test\master\.
- The ICD-9-CM program is called: cci\_test\_master.sas.
- The ICD-10-CM program is called: cci10\_test\_master.sas.

The latest CMS master tables are loaded into SAS by the programmer and then converted into SAS formats. This work will be done in the \test\master\ directory for each tool. The 2010 master file is located at \\thuscasanfs02\tsh\hcup5\processing\dx & pr codes\icd9-cm\FYyyyy.

- The ICD-9-CM table is named: CMS27\_DESC\_SHORT\_DX.TXT
- The ICD-10-CM table is named: ICD\_10\_DX\_2001\_SHORT.txt.

The HCUP master table of diagnoses is a SAS format. The latest HCUP master table is located here: \\thuscasanapp23\lun0\shared\master\formats\yyyy\.

- The ICD-9-CM format is called: \$dx\_ver
- The ICD-10-CM format has yet to be created.

**B: Regression Test:** The following programs are employed to regression test the CCI tools with the tools from the previous year.

- The ICD-9-CM code is stored in the directory \\thuscasanapp25\lun0\tools\CCI\yyyy\test\regression\.
- The ICD-10-CM code is stored in the directory \\thuscasanapp25\lun0\tools\CCI\icd-10-cm\yyyy\test\regression\.
- The ICD-9-CM program is called: CCI\_test\_regression\_yyyy.sas.
- The ICD-10-CM program is called: CCI10\_test\_regression\_yyyy.sas.

— **C: NIS Comparison Test:** This test is not performed for the CCI on any database because the tool is new. Thus, existing databases do not contain CCI categories.

**D: QA Test:** This check involves first loading each tool file into a SAS format to make sure that it loads correctly. A data test of each format is then performed by creating a

dataset using SAS Cards and applying the format. Duplicate codes and categories with missing values are also reported in this test.

- The ICD-9-CM program can be found in the directory \\thuscasanapp25\lun0\tools\CCI\yyyy\test\qa\.
- The ICD-10-CM program can be found in the directory \\thuscasanapp25\lun0\tools\CCI\icd-10-cm\yyyy\test\qa\.
- The ICD-9-CM program is: CCI\_QA.sas
- The ICD-10-CM program is: CCI10\_QA.sas

### **Comorbidity Software (Comorb ICD-9-CM and Comorb ICD-10-CM):**

#### **Step 1: Obtain New Codes**

<http://www.gpoaccess.gov/fr/>: This Website contains the annual government updates to the ICD-9-CM and ICD-10-CM diagnosis and DRG codes, as published in the *Federal Register*. This Web resource is utilized in Step 1 of the Comorb update process.

<http://www.ingenixonline.com>: The Encoder Pro software is used to identify new or discontinued ICD-9-CM and ICD-10-CM and DRG codes for the Comorb tool. This Website is utilized in Step 1 of the Comorb update process.

#### **Step 2: Update Mappings**

One file each contains the updated mappings of ICD-9-CM and ICD-10-CM diagnosis and MS-DRG codes to be used in the Comorbidity Software for fiscal year yyyy. Each file is created in Step 2 of the Comorb update process.

- The ICD-9-CM file is located at \\thuscasanapp25\lun0\tools\comorb\yyyy\mapping\.
- The ICD-10-CM file is located at \\thuscasanapp25\lun0\tools\comorb\icd-10-cm\yyyy\mapping\.

#### **Step 3: Update Software and Documentation**

The Comorbidity Software consists of two files: 1) A SAS format program for diagnoses and MS-DRGs, and 2) a SAS program to create the data elements. Both files are updated using the spreadsheet from Step 2.

- The ICD-9-CM files are stored under the directory \\thuscasanapp25\lun0\tools\comorb\yyyy\pgms\.
- The ICD-10-CM files are stored under the directory \\thuscasanapp25\lun0\tools\comorb\icd-10-cm\yyyy\pgms\.

The ICD-9-CM files are called:

- Comformat[year].txt
- Comoanaly[year].txt

The ICD-10-CM files are called:

- Comformat\_icd10cm\_[year].txt
- Comoanaly\_icd10cm\_[year].txt

The documentation for the Comorbidity tools consists of HTML text for the Web pages, tables showing the ICD-9-CM or ICD-10-CM changes for the current tool (Table 1), and a table that lists the diagnosis and DRG codes for each comorbidity (Table 2).

- The ICD-9-CM documents are located in the directory \\thuscasanapp25\lun0\tools\comorb\yyyy\documentation\.
- The ICD-10-CM documents are located in the directory \\thuscasanapp25\lun0\tools\comorb-icd-10-cm\yyyy\documentation\.

The three ICD-9-CM files are:

- table1-Fyyyyy-vx\_x.doc
- table2-Fyyyyy-vx\_x.doc
- comorbidity.doc
- 

The three ICD-10-CM files are:

- table1-icd10cm-Fyyyyy-vx\_x.doc
- table2-icd10cm-Fyyyyy-vx\_x.doc
- comorbidity.doc

#### **Step 4: Manual Check of Software**

— A TR Research Assistant will verify the programs and documentation in Step 3 with the Excel table of Revised Mappings in Step 2. The Research Assistant will notify project personnel of any problems discovered.

#### **Step 5: Run Software QA Checks**

— The updated code will be run against a subset of the NIS to confirm that no errors were introduced during editing that might prevent its successful execution. The output file from the NIS test will be compared to the previous year's NIS test file using SAS Proc Compare to verify the changes.

- The ICD-9-CM document is located in the directory \\thuscasanapp25\lun0\tools\comorb\yyyy\test\compare\.
- The ICD-10-CM document is located in the directory \\thuscasanapp25\lun0\tools\comorb-icd-10-cm\yyyy\test\compare\.
- The ICD-9-CM file name is: Comorb\_regression\_test.sas
- The ICD-10-CM file name is: Comorb10\_regression\_test.sas

— The following location can be used to obtain the latest version of the NIS core file for testing purposes: \\thuscasanapp25\lun0\nis\yyyy\sasdata\nis\_yyyy\_core.sas7bdat.