

Avoiding Hiccups with HCUP: A Beginner's Guide to HCUP at WMed (NIS, KID, NRD Edition)

The following provides information on the documentation needed to complete a Healthcare Cost and Utilization Project (HCUP) research study at WMed using the **NIS** (National Inpatient Sample), the **KID** (Kids' Inpatient Database) or the **NRD** (Nationwide Readmissions Database). WMed's HCUP data sources are overseen by the WMed Data Analytics Unit (DASU). Any questions can be directed to dataanalytics@wmed.edu

Please note that there is separate documentation for the NEDS (National Emergency Department Sample).

Initiating a New HCUP Project

To initiate a new project and schedule a consultation with the DASU, please submit a Project Request & Triage form: <https://edc.wmed.edu/surveys/?s=8KLWR3YFLW>. Prior to the consultation, or project initiation meeting, teams should provide the DASU team with a draft of the protocol (see information on the protocol template below). Desired research questions **must** be listed. Any questions or additional documents can be submitted to the Research Navigator: research.navigators@wmed.edu

Prior to project implementation and analysis, the DASU team requires the following documentation to be completed in full:

1. Word document protocol
2. Excel file template for target population and comorbidity/procedure ICD code descriptors

Protocol

A written protocol is required for all HCUP projects. An HCUP protocol template can be found on the WMed HRPP/IRB Forms and Templates webpage: <https://wmed.edu/node/723>.

Teams should complete the protocol to the best of their ability. Teams do **not** have to complete the statistical plan section; after meeting with the investigative team, a WMed biostatistician will assist with this section. It is important for study teams to list clear objectives and/or research questions in the protocol so the appropriate statistical analysis plan can be written.

Excel File of Data Descriptors and ICD Codes

In order to provide clarity for the biostatisticians and maximize efficiency, an International Classification of Diseases (ICD) Excel template has been created for collecting ICD codes for HCUP projects. Note: Teams **must** use this template for HCUP projects.

There are 4 sections in the Excel file: 1) defining the target population (inclusion/exclusion criteria), 2) comorbidities/ co-occurrences of interest, 3) procedures of interest, and 4) (**NRD only**) readmission criteria

How to Find Codes

The HCUP databases include **billable ICD or PCS codes**.

The following websites can be used to look up codes:

ICD 10: <https://www.icd10data.com>

ICD 9: <https://www.icd9data.com>

Note: For projects utilizing NRD, only ICD10 (2016-forward) is available)

The screenshot shows a search for ICD-10-CM code E10.618. The top part shows a list of codes with red arrows pointing to E10, E10.1, E10.10, E10.11, and E10.2. Below this, a detailed view of E10.618 is shown, including the code description 'Type 1 diabetes mellitus with other diabetic arthropathy' and a link to 'Diabetes type 1 with arthropathy; Type 1 diabetes mellitus with arthropathy'. A breadcrumb trail shows the navigation path: ICD-10-CM Codes > E00-E89 > E08-E13 > E10- > 2024. Below the breadcrumb trail, the code E10.618 is displayed. At the bottom, a list of codes is shown with red arrows pointing to E10, E10.1, E10.10, E10.11, and E10.2. The code E10.11 is circled in red.

Only the codes with the **green arrows** are searchable in HCUP; those with the **red arrows** will not pull results.

For example, if we want to look at the full hierarchy of options for type 1 diabetes, we would put diabetes in the search bar. Then, we could click on option E10.618 on the results screen. The next page will bring up more details on code E10.618. To see the full list of options for type 1 diabetes, we can then click on E10 to go back to the leading category. On the E10 page, if we scroll down to the codes, we can see all the codes that fall into the Type 1 diabetes category and can easily grab the ones with the green arrows that meet the search criteria for the project. So, if we were interested in patients with type 1 diabetes with ketoacidosis with coma, we would include **E10.11** on the Excel spreadsheet.

Completing the Excel File of Data Descriptors and ICD Codes

Target (Inclusion/Exclusion Criteria) Worksheet (1st tab)

The 1st worksheet (tab) of the Excel file is for placing inclusion and/or exclusion criteria.

Inclusion:

The first part is for inclusion codes (for identifying population of interest).

INCLUSION CRITERIA					
<i>Note: Depending on year, include either ICD 9 or ICD 10 codes (or both)</i>					
<i>Note: Be sure to include BILLABLE codes (Ex. J41, J41.0, J41.1 etc, not just J41). HCUP cannot identify J41*</i>					
https://www.icd10data.com/ICD10CM/Codes					
COPD					
ICD 9:	Description	Code	ICD 10:	Description	Code
	Simple chronic bronchitis	491		Simple mucopurulent chronic bronchitis	J41
	etc.			Simple chronic bronchitis	J41.0
				Mucopurulent chronic bronchitis	J41.1
				Mixed chronic bronchitis	J41.8
				Unspecified chronic bronchitis	J42
				Etc.	Etc.

Teams should start in the dark grey header by stating the variable of interest (COPD).

Depending on the years the team is interested in analyzing, include **ICD9** (1993-2014, red on left), **ICD10** (2016-present, green on right), or both. If teams are only doing ICD9 or ICD10, they need to only fill in that part of the Excel worksheet and leave the other part blank. For example, if a team is only interested in the years 2016-present, they would fill out the ICD10 side and leave the ICD9 side blank. *Note: NRD is only ICD10.*

Note: The ICD codes must be in their own column with no other text.

Teams can create another dark grey header and repeat the process if there is a second inclusion criteria. For example, if a team is comparing two cohorts, they would create another section. Or, if a team wanted to look at patients with COPD *and* CKD, they would include a dark grey header for ‘CKD’ and then list the ICD codes for that variable.

There is also an option to put other criteria not related to ICD codes, such as limiting ICD codes to only primary diagnosis, limiting to a specific age group, etc.

OTHER CRITERIA (Not ICD Codes)	
	<i>Options such as: age restriction (i.e. > 18), limit to only primary diagnosis (DX1)</i>

Exclusion:

Still on the 1st tab, the team can put **exclusion** criteria (codes they want to **not** occur in sample)

EXCLUSION CRITERIA				
<i>Are there specific ICD codes you do NOT want in the target sample?</i>				
NAME				
ICD 9:	Description	Code	ICD10:	Description

A variable name should go in the grey header. Depending on the project, ICD9 or ICD10 (or both) codes should be included.

Comorbidities Worksheet (2nd Tab)

The second tab allows for comorbidities and/or co-occurrences the team is interested in analyzing.

COMORBIDITIES & CO-OCCURENCES					
<i>Note: Be sure to include BILLABLE codes (Ex. J41, J41.0, J41.1 etc, not just J41). HCUP cannot identify J41*</i>					
https://www.icd10data.com/ICD10CM/Codes					
Hypertension					
ICD 9:	Description	Code	ICD 10:	Description	Code
	Malignant essential hypertension	401.0		Essential hypertension	I10
	Benign essential hypertension	401.1		Secondary hypertension	I15
	Etc.			Renovascular hypertension	I15.0
				Etc.	

The heading should make it clear how to group the codes (i.e., which codes to include for a diagnosis, example ‘Hypertension’). Depending on the years of interest, the team would include the ICD codes for **ICD9** (red arrow, on left) and/or **ICD 10** (green arrow, on right). **Note: The ICD codes must be in their own column with no other text.**

Teams are welcome to include as many or as few comorbidities as they desire for the project; however, adding additional comorbidities may require longer for the study team to identify the necessary ICD codes and may add some time to the analysis. Keep adding gray headings to specify each new variable.

Elixhauser Comorbidity Software

Some comorbidities are already included in the HCUP database. They are classified using the Elixhauser Comorbidity software. The table below contains a list of the variables.

Note: Some are only available in ICD9 or ICD10 but not both. If teams would rather use these than find individual ICD codes, they can indicate so on the Excel worksheet; simply put “AIDS - Elixhauser” (there is no need to then list additional ICD codes). Definitions for the codes included in each group can be found here:

<https://hcup-us.ahrq.gov/toolssoftware/comorbidityicd10/CMR-Reference-File-v2025-1.xlsx>

Obesity					
ICD 9:	Description	Code	ICD 10:	Description	Code
				Elixhauser	
Chronic pulmonary disease					
ICD 9:	Description	Code	ICD 10:	Description	Code
				Elixhauser	
Peripheral vascular disease					
ICD 9:	Description	Code	ICD 10:	Description	Code
				Elixhauser	

The list of Elixhauser variables is available on the WMed HCUP website under the FAQ's:

<https://wmed.edu/node/3881>

Procedures Worksheet (3rd Tab)


The third tab of the Excel file allows for procedures, if applicable.

PROCEDURES

Note: Must be in PCS Format - include for ICD9 and/or ICD10

<https://www.icd10data.com/ICD10PCS/Codes>

Procedure code for Implant of Endobronchial valve, per endoscopy

ICD 9:	Description	Code	ICD 10:	Description	Code
	Endoscopic insertion or replacement of bronchial valve(s), single	33.71		Insertion of Endobronchial Valve into R Main Bronc, Endo	0BH38GZ
	Endoscopic insertion or replacement of bronchial valve(s), multi	33.73		Insertion of Endobronchial Valve into R Up Lobe Bronc,	0BH48GZ
	Etc			Insertion of Endobronchial Valve into R Mid Lobe Bronc, Endo	0BH58GZ
				Etc	

The heading (Endobronchial valve, per endoscopy) should make it clear how to group the codes. Again, depending on the years of interest, the team should include the PCS codes for **ICD9** (red arrow, on left) and/or **ICD 10** (green arrow, on right).

Procedure codes must be in **PCS format**. Codes can be accessed at this website:

<https://www.icd10data.com/ICD10PCS/Codes>

Again, only the billable codes are recorded in HCUP (those with green arrows in the image below):

[ICD-10-PCS](#) > [0](#) > [1](#) > [2](#) > Peripheral Nerve

Peripheral Nerve

- ▶ 012Y Peripheral Nerve
 - ▶ 012YX External
 - ▶ 012YX0 Drainage Device
 - ▶ 012YX0Z Change Drainage Device in Peripheral Nerve, External Approach
 - ▶ 012YXY Other Device
 - ▶ 012YXYZ Change Other Device in Peripheral Nerve, External Approach

Note: The PCS codes must be in their own column in the Excel worksheet with no other text.

Readmissions Tab (NRD Only)

The final tab is for projects utilizing the NRD (NIS and KID cannot be used to capture readmissions).

Study teams will need to determine what criteria should be used to determine a readmission for their population of interest (as it pertains to the study objectives).

READMISSION TIMEFRAME			
<i>Note: The NRD can only track readmissions within the same calendar year; as such, we cannot track across multiple years</i>			
<i>What timeframe constitutes a readmission from one inpatient admission to the next? (7 days, 30 days, etc.)</i>			

First, teams will need to identify a readmission timeframe (7 days, 30 days, etc.).

Note: The NRD can only track readmissions within the same calendar year. It cannot track one person across multiple years. It also cannot track readmissions if a person sought care in another State (i.e., we cannot link a person who initially was admitted in Michigan but then re-admitted in Indiana).

READMISSION CRITERIA			
<i>Include any diagnoses/procedures that are relevant to your project that would constitute an applicable readmission.</i>			
<i>If using same criteria as before, please copy/paste relevant codes here</i>			
COPD			
Description	Code	Type (ICD/PCS)	
Simple mucopurulent chronic bronchitis		J41	ICD
Simple chronic bronchitis		J41.0	
Mucopurulent chronic bronchitis		J41.1	
Mixed chronic bronchitis		J41.8	
Unspecified chronic bronchitis		J42	
<i>Etc.</i>		<i>Etc.</i>	

Study teams should also include relevant ICD/PCS codes that should be used to identify whether a readmission should be included for the project. For example, if a team wanted to look at patients that are re-admitted for COPD, they would include “COPD”.

Team should include the variable name (COPD), a description, and the relevant ICD10 codes (Only 2016-forward available for the NRD database). Teams should also indicate if these are ICD or PCS codes (the statisticians need this to know how to correctly pull from the database).