

Avoiding Hiccups with HCUP: A Beginner's Guide to HCUP at WMed (NEDS Edition)

The following provides information on the documentation needed to complete a Healthcare Cost and Utilization Project (HCUP) research study at WMed using the **NEDS (Nationwide Emergency Department Sample)**. 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 other HCUP databases (NIS, KID, NRD).

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.

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/PCS/CPT 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 3 sections in the Excel file: 1) defining the target population (inclusion/exclusion criteria), 2) comorbidities/ co-occurrences of interest, 3) procedures in ED (treat and release patients) and/or procedures for patients admitted (from ED to the same hospital)

Note: Due to the way the NEDS is built, patients admitted will have procedures coded as PCS (not CPT) codes; however, it is not possible to determine if the procedures occurred in the ED or as part of the admission.

How to Find Codes

The HCUP databases include **billable codes**. Note that WMed only has ICD10 (2016-forward) for the NEDS.

The following websites can be used to look up ICD or PCS codes:

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

- ▶ E10 Type 1 diabetes mellitus
 - ▶ E10.1 Type 1 diabetes mellitus with ketoacidosis
 - ▶ E10.10 without coma
 - ▶ E10.11 with coma
 - ▶ E10.2 Type 1 diabetes mellitus with kidney complications
 - ▶ E10.21 Type 1 diabetes mellitus with diabetic nephropathy
 - ▶ E10.22 Type 1 diabetes mellitus with diabetic chronic kidney disease
 - ▶ E10.29 Type 1 diabetes mellitus with other diabetic kidney complication
 - ▶ E10.3 Type 1 diabetes mellitus with ophthalmic complications
 - ▶ E10.31 Type 1 diabetes mellitus with unspecified diabetic retinopathy
 - ▶ E10.311 with macular edema
 - ▶ E10.319 without macular edema

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

The screenshot shows a search result for ICD-10-CM code E10.618. The code is circled in blue. Below the code, the text "Type 1 diabetes mellitus with other diabetic arthropathy" is highlighted in yellow. A link "[convert to ICD-9-CM]" is visible next to the code. Below this, a breadcrumb trail shows "ICD-10-CM Codes > E00-E89 > E08-E13 > E10- > 2024" with "E10-" circled in blue. Below the breadcrumb trail, the text "ICD-10-CM Diagnosis Code E10.618" is displayed. At the bottom, a list of codes is shown under the heading "Codes". The list includes "E10 Type 1 diabetes mellitus", "E10.1 Type 1 diabetes mellitus with ketoacidosis", "E10.10 without coma", "E10.11 with coma" (circled in blue), and "E10.2 type 1 diabetes mellitus with kidney complications".

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

The *Target* 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: Be sure to include BILLABLE codes (Ex. J41, J41.0, J41.1 etc, not just J41). HCUP cannot identify J41*</i>	
COPD	
Description	ICD10 Code
Simple mucopurulent chronic bronchitis	J41
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>

Teams should start in the dark grey header by stating the variable of interest (COPD). This tells the statistician pulling the data how to group ICD codes of interest together. The team should then include any ICD codes that should be used to identify “COPD” for the purpose of this project.

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 ICD 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 *Target* tab, the team can put **exclusion** criteria (codes they want to **not** occur in sample)

EXCLUSION CRITERIA	
Are there specific ICD codes you do NOT want in the target sample?	
NAME	
Description	ICD10 Code

Comorbidities Tab

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

This is for including other ICD codes of interest, such as comorbidities or co-occurrences. It is important that these are denoted so statisticians can know how to group together. More comorbidities or co-occurrences can be added - copy/paste the grey heading and as as many as is needed.	
COMORBIDITIES & CO-OCCURENCES	
Note: Be sure to include BILLABLE codes (Ex. J41, J41.0, J41.1 etc, not just J41). HCUP cannot identify J41*	
Hypertension	
Description	ICD10 Code
Essential hypertension	I10
Secondary hypertension	I15
Renovascular hypertension	I15.0
<i>Etc.</i>	

The heading should make it clear how to group the codes (i.e., which codes to include for a diagnosis, example ‘Hypertension’). **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.

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/toolsoftware/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	

Again, only ICD10 (2016-forward) is available in NEDS.

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

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

Procedures

The *Procedures* sheet is for identifying procedures performed. There are two sides to this sheet.

The left side is for identify procedures for patients who were treated in the ED and then released (were not admitted from the ED to the same hospital). This side uses **CPT/HCPCS** codes. Teams can identify these codes by searching online or by speaking with a professional biller/coder for guidance.

**This side is for any procedures that may occur for patients that are treated and released from the ED
(not admitted into same hospital)**

PROCEDURES

Note: Procedures here must be in CPT/HCPCS format

Liver MRI

Description	Code
Magnetic Resonance Image (MRI) scan of the abdomen without contrast	74181
Magnetic Resonance Image (MRI) scan of the abdomen with contrast	74182
Magnetic Resonance Image (MRI) scan of the abdomen without contrast	74183

The right side of this sheet is for identifying procedures for patients who were seen in the ED and then admitted to the same hospital (approximately 15% of records in NEDS depending on year). Because these patients' information is collected at the inpatient discharge, procedures are in the **PCS format**.

Note: Due to the way NEDS is built, there is no way to determine if procedures for these patients were performed in the ED or as part of the inpatient admission. The DASU is available to discuss with teams how to approach this for a project.

Optional: This side is for any procedures that may occur for patients who are seen in the ED and then admitted to the same hospital.

PROCEDURES

Note: Procedures here must be in PCS format

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

Note: For these patients, there is no way to identify if the procedure was performed in the ED or as part of the inpatient admission. This is a limitation of NEDS. (Optional if not wanting to include inpatient admissions).

Liver MRI

Description	Code
Magnetic Resonance Imaging (MRI) of Liver using Other Contrast, Ur	BF35Y0Z
Magnetic Resonance Imaging (MRI) of Liver using Other Contrast	BF35YZZ
Magnetic Resonance Imaging (MRI) of Liver	BF35ZZZ

PCS 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