

Avoiding Hiccups with HCUP: A Beginner's Guide to HCUP at WMed

The following provides information on the documentation needed to complete a Healthcare Cost and Utilization Project (HCUP) research study at WMed. WMed's HCUP data sources are overseen by the WMed Data Analytics Unit (DASU). Any questions can be directed to dataanalytics@wmed.edu

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 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, and 3) procedures of interest

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>

A screenshot of the ICD-10-CM hierarchy for Type 1 diabetes mellitus. The hierarchy is as follows:

- ▶ 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.

A screenshot of the ICD-10-CM search results for E10.618. The search results are as follows:

ICD-10-CM Diagnosis Code **E10.618** [convert to ICD-9-CM]

Type 1 diabetes mellitus with other diabetic arthropathy

Diabetes type 1 with arthropathy; Type 1 diabetes mellitus with arthropathy

ICD-10-CM Codes > E00-E89 > E08-E13 > **E10-** > 2024

ICD-10-CM Diagnosis Code E10.618

Codes

- ▶ 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

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.

This is a sample template for submitting diagnosis codes for a HCUP project. It would be submitted along with a protocol. This setup allows for efficiency and clarity with the biostatisticians when creating the SAS code.

This sheet is for designating the criteria for the population of interest.

INCLUSION CRITERIA
Note: Depending on year, include either ICD 9 or ICD 10 codes (or both)
Note: Be sure to include ALL codes -- including codes within other codes (Ex. J41 and J41.0 and J41.1 etc, not just J41)

Lung abscess

ICD 9:	Description	Code	ICD 10:	Description	Code
	Lung abscess	5130		Gangrene and necrosis of lung	J85.0
	Amebiac lung abscess	0064		Abscess of lung with pneumonia	J85.1
				Abscess of lung without pneumonia	J85.2
				Amebic lung abscess	A06.5

ANOTHER DIAGNOSIS, if applicable

ICD9:	Description	Code	ICD10:	Description	Code

OTHER CRITERIA (Not ICD Codes)
Only primary diagnosis
Adults age >= 18

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

History of tuberculosis

ICD 9:	Description	Code	ICD10:	Description	Code
	Primary tuberculous infection, unspecified	01000		J65 Pneumoconiosis associated with tuberculosis	J65
	Primary tuberculous infection, bacteriological or histological exam	01001		O98011 Tuberculosis complicating pregnancy, fi	O98.011
	Primary tuberculous infection, bacteriological or histological exam	01002		O98012 Tuberculosis complicating pregnancy, s	O98.012
	Primary tuberculous infection, tubercle bacilli found (in sputum) by	01003		O98013 Tuberculosis complicating pregnancy, t	O98.013

Inclusion:

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

INCLUSION CRITERIA
Note: Depending on year, include either ICD 9 or ICD 10 codes (or both)
Note: Be sure to include ALL codes -- including codes within other codes (Ex. J41 and J41.0 and J41.1 etc, not just J41)

Lung abscess

ICD 9:	Description	Code	ICD 10:	Description	Code
	Lung abscess	5130		Gangrene and necrosis of lung	J85.0
	Amebiac lung abscess	0064		Abscess of lung with pneumonia	J85.1
				Abscess of lung without pneumonia	J85.2
				Amebic lung abscess	A06.5

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

Depending on the years the team is interested in analyzing, include **ICD9** (1993-2014, red on left), **ICD10** (2016-2021, 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 2016-2021, they would fill out the ICD10 side and leave the ICD9 side blank.

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, a team could do one dark grey header for 'Lung Abscess' and a second dark grey header for 'Fungus' if they want to look at cases of lung abscess AND fungus.

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

20					
21	OTHER CRITERIA (Not ICD Codes)				
22	Only primary diagnosis				
23	Adults age >= 18				
24					

Exclusion:

Still on the 1st 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?					
History of tuberculosis					
ICD 9:	Description	Code	ICD10:	Description	Code
	Primary tuberculous infection, unspecified	01000		J65 Pneumoconiosis associated with tuberculosis	J65
	Primary tuberculous infection, bacteriological	01001		O98011 Tuberculosis complicating pregnancy, first trimester	O98.011
	Primary tuberculous infection, bacteriological	01002		O98012 Tuberculosis complicating pregnancy, second trimester	O98.012
	Primary tuberculous infection, tubercle bacilli	01003		O98013 Tuberculosis complicating pregnancy, third trimester	O98.013
	Primary tuberculous infection, tubercle bacilli	01004		O98019 Tuberculosis complicating pregnancy, unspecified trimester	O98.019

A **variable name** goes in the dark grey header (blue arrow). Again, depending on the years of interest, the team would include the ICD codes for **ICD9** (red arrow) and/or **ICD 10** (green arrow).

Comorbidities/ Co-Occurrences Worksheet (2nd Tab)

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

COMORBIDITIES & CO-OCCURRENCES					
Hypertension					
ICD 9:	Description	Code	ICD 10:	Description	Code
	401.0- Malignant essential hypertension	401.0		I10 Essential (primary) hypertension	I10
	401.1- Benign essential hypertension	401.1		I110 Hypertensive heart disease with heart failure	I110
	401.9- Unspecified essential hypertension	401.9		I119 Hypertensive heart disease without heart failure	I119
	404.00- Hypertensive heart and chronic kidney disease, malignant, without heart failure	404.00		I120 Hypertensive chronic kidney disease with stage 5 chronic kidney disease or dialysis	I120
	404.01- Hypertensive heart and chronic kidney disease, malignant, with heart failure	404.01		I121 Hypertensive chronic kidney disease with stage 4 chronic kidney disease or dialysis	I121

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) and/or **ICD 10** (green arrow). **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.

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>

Diagnosis	ICD9	ICD10
Aids	Y	Y
Alcohol abuse	Y	Y
Deficiency anemias	Y	Y
Autoimmune Conditions		Y
Rheumatoid arthritis/collagen vascular disease	Y	
Chronic blood loss anemia	Y	Y
Lymphoma	Y	Y
Leukemia		Y
Metastatic Cancer	Y	Y
Solid tumor without metastasis, in situ	Y	Y
Solid tumor without metastasis, malignant		Y
Cerebrovascular disease		Y
Congestive heart failure	Y	Y
Chronic pulmonary disease	Y	Y
Coagulopathy	Y	Y
Dementia		Y
Depression	Y	Y
Diabetes, uncomplicated	Y	Y
Diabetes with chronic complications	Y	Y
Drug abuse	Y	Y
Hypertension (uncomplicated and complicated)	Y	Y
Hypothyroidism	Y	Y
Other thyroid disorders		Y
Liver disease	Y	Y
Fluid and electrolyte disorders	Y	
Neurological disorders affecting movement		Y
Other neurological disorders	Y	Y
Seizures and epilepsy		Y
Obesity	Y	Y
Paralysis	Y	Y
Peripheral vascular disorders	Y	Y
Psychoses	Y	Y
Pulmonary circulation disorders	Y	Y
Renal failure	Y	Y
Peptic ulcer disease excluding bleeding	Y	Y
Valvular disease	Y	Y
Weight loss	Y	Y

Procedures Worksheet (3rd Tab)

The third and final 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				
Invasive mechanical ventilation				
ICD 9:	Description	Code	ICD 10:	Description
	Other continuous invasive mechanical ventilation	96.7		Assistance with Respiratory Ventilation, Less than 24 Consecutive Hours
	Continuous invasive mechanical ventilation for less than 96 hours	96.71		Assistance with Respiratory Ventilation, 24-96 Consecutive Hours
	Continuous invasive mechanical ventilation for more than 96 hours	96.72		Assistance with Respiratory Ventilation, Greater than 96 Consecutive Hours
	Insertion Of Endotracheal Tube	96.04		Respiratory Ventilation, Less than 24 Consecutive Hours
				Respiratory Ventilation, 24-96 Consecutive Hours

The [heading](#) should make it clear how to group the codes. Again, depending on the years of interest, the team would include the PCS codes for **ICD9** (red arrow) and/or **ICD 10** (green arrow).

Procedure codes must be **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.