USER GUIDE:

CLINICAL CLASSIFICATIONS SOFTWARE REFINED (CCSR) FOR ICD-10-CM DIAGNOSES, v2020.2

Issued February 2020

Agency for Healthcare Research and Quality
Healthcare Cost and Utilization Project (HCUP)
Phone: (866) 290-HCUP (4287)
Email: hcup@ahrq.gov
Website: www.hcup-us.ahrq.gov

TABLE OF CONTENTS

Introduction 1
Comparison of the CCSR for ICD-10-CM Diagnoses, the Beta Versions of the CCS for ICD-10-CM, and the CCS for ICD-9-CM 2
Description of the CCSR for ICD-10-CM 4
The Structure of the CCSR 4
CCSR Assignment Guidelines 6
General Assignment Guidelines 6
Body System-Specific Structure Notes and Exceptions to General Guidelines 7
One-to-One and One-to-Many Mapping of ICD-10-CM Diagnosis Codes to CCSR 10
Why Cross-Classification of Codes are Necessary in the CCSR 10
Default CCSR for Principal Diagnosis 11
Capitalizing on ICD-10-CM Diagnosis Coding Specificity 11
Episode of Care Coding in ICD-10-CM Diagnoses 14
Example of Episode of Care CCSR Categories 14
Pregnancy Trimester Coding in ICD-10-CM Diagnoses 16
Impact of New Clinical CCSR Categories on Users 16
Using the Downloadable CCSR Files 17
System Requirements 17
Downloadable Files 17
Flexible File Structure for Outputting the CCSR for ICD-10-CM Diagnoses 19
Output Option 1, Vertical Output File 19
Output Option 2, Horizontal Array of all CCSR Categories 19
Output Option 3, Optional File with Default Assignment for Principal Diagnosis 20
Example of Output from the Three Different Output Files 20
Representation of ICD-10-CM Diagnosis Codes 22
Running the SAS Program to Add CCSR Categories to Data 23
Appendix A: Background on the Development of the CCSR 25
Impact on the Clinical Classifications Software 25
Refinement of the Beta Versions of the CCS 25
Refinement Review Process 26
Appendix B: Default CCSR for the Principal Diagnosis 28
Introduction 28
Guidelines for Determining the Default CCSR for the Principal Diagnosis 29
Appendix C: Cross-Referencing the CDC Injury and External Cause Matrices to the CCSR for ICD-10-CM Diagnoses 37

INDEX OF TABLES AND FIGURES

Table 1. Differences Between the CCSR for ICD-10-CM, CCS for ICD-10-CM, and CCS for ICD-9-CM 3
Table 2. Three-Character Abbreviation for ICD-10-CM Body Systems 5
Figure 1. Example of One-to-One and One-to-Many CCSR Mappings for Hypertension and Heart Failure 10
Table 3. Type of CCSR Category Assignment by Number of ICD-10-CM Codes, v2020.2 11
Table 4. Number of CCSR and CCS (Beta Versions) Categories by Body System 12
Table 5. Example of CCSR Categories for Episode of Care 15
Table 6. Example of CCSR Categories by Pregnancy Trimester 16
Table 7. Contents of the CCSR for ICD-10-CM Diagnoses Zip File 18
Table 8. Sample of Input File Record 21
Table 9. Example of the Vertical Output File for the Sample Record 21
Table 10. Example of Horizontal Output File 22
Table 11. Example of the Optional Output File for Default Assignment for the Principal Diagnosis 22
Table 12. Example of Representation of ICD-10-CM Diagnosis Codes in the CCSR for ICD-10-CM 22
Table 13. Modifiable Macro Variables and Directory Paths 23
Table B.1. Type of Default CCSR Assignment by Number of ICD-10-CM Codes, v2020.2 29
Figure 2. Hierarchical Guidelines for Assignment of Default CCSR for the Principal Diagnosis 30
Table B.2. ICD-10-CM Codebook Chapters Organization and CCSR Abbreviations 35
Table B.3. Exceptions to Guideline 12 to Default to the matching Codebook Chapter 36
Table C.1. CDC Nature of Injury by CCSR Category 37
Table C.2. CDC Injury Intent by CCSR Category 41
Table C.3. CDC Injury Mechanism by CCSR Category 41

ACKNOWLEDGEMENTS

This work was funded by the Agency for Healthcare Research and Quality (AHRQ) under contract HHSA-290-2018-00001-C. AHRQ gratefully acknowledges the contributions of American Health Information Management Association (AHIMA)-certified ICD-10-CM/PCS trainers at the Ohio State University; clinical experts from the University of California, Davis, and the RAND Corporation, the National Institutes of Health, and the technical team at IBM Watson Health. The Healthcare Cost and Utilization Project (HCUP) is a family of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by AHRQ. HCUP would not be possible without the contributions of the following data collection Partners from across the United States:

Alaska Department of Health and Social Services
Alaska State Hospital and Nursing Home Association
Arizona Department of Health Services
Arkansas Department of Health
California Office of Statewide Health Planning and Development
Colorado Hospital Association
Connecticut Hospital Association
Delaware Division of Public Health
District of Columbia Hospital Association
Florida Agency for Health Care Administration
Georgia Hospital Association
Hawaii Laulima Data Alliance
Illinois Department of Public Health
Indiana Hospital Association
Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Louisiana Department of Health
Maine Health Data Organization
Maryland Health Services Cost Review Commission
Massachusetts Center for Health Information and Analysis
Michigan Health & Hospital Association
Minnesota Hospital Association (provides data for Minnesota and North Dakota)
Mississippi State Department of Health
Missouri Hospital Industry Data Institute
Montana Hospital Association
Nebraska Hospital Association
Nevada Department of Health and Human Services
New Hampshire Department of Health & Human Services
New Jersey Department of Health
New Mexico Department of Health
New York State Department of Health
North Carolina Department of Health and Human Services
North Dakota (data provided by the Minnesota Hospital Association)
Ohio Hospital Association
Oklahoma State Department of Health
Oregon Association of Hospitals and Health Systems
Oregon Office of Health Analytics
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina Revenue and Fiscal Affairs Office
South Dakota Association of Healthcare Organizations
Tennessee Hospital Association
Texas Department of State Health Services
Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health
West Virginia Department of Health and Human Resources, West Virginia Health Care Authority
Wisconsin Department of Health Services
Wyoming Hospital Association

INTRODUCTION

This report provides technical documentation for the Healthcare Cost and Utilization Project (HCUP) Clinical Classifications Software Refined (CCSR) for International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM)-coded diagnoses. Starting in October 1, 2015, diagnoses for hospital inpatient stays and outpatient encounters in the United States are reported using the ICD-10-CM coding system. ICD-10-CM consists of more than 70,000 diagnosis codes. Although it is possible to present descriptive statistics for individual ICD-10-CM diagnosis codes, it is often more useful to aggregate codes into clinically meaningful categories. The CCSR for ICD-10-CM diagnoses provides one method for aggregating codes.

Similar to the original Clinical Classifications Software (CCS) for ICD-9-CM-coded diagnoses, the CCSR for ICD-10-CM:

- Classifies diagnoses into clinically meaningful categories
- Provides a means by which to identify specific clinical conditions using diagnosis codes
- Can be used analytically to examine patterns in healthcare cost, utilization, and outcomes; perform rank utilization by diagnoses; and risk-adjust by clinical condition.

The CCS for ICD-9-CM diagnoses was translated to ICD-10-CM prior to the availability of ICD-10-CM-coded data and released as a beta version. Once ICD-10-CM-coded data became available, the beta versions of the CCS were evaluated using the HCUP databases and unexpected discontinuities between the ICD-9-CM and ICD-10-CM beta versions of the CCS were revealed. In addition, there was interest in taking advantage of the specificity built into ICD-10-CM diagnosis codes.

These findings led to the development of the CCSR for ICD-10-CM diagnoses. The CCSR balances the retention of the clinical concepts included in the CCS categories under ICD-9-CM and capitalizes on the specificity of ICD-10-CM diagnoses by creating new clinical categories. In addition, the CCSR allows ICD-10-CM diagnosis codes to be cross classified into more than one category because individual codes can be used to document multiple conditions or a condition and a common symptom/manifestation. The cross-classification of a diagnosis to more than one CCSR category is beneficial for risk adjustment and the identification of comorbidities. However, for some applications, such as ranking hospitalizations by the principal diagnosis, a mutually exclusive categorization scheme is needed. To facilitate this type of analysis, the CCSR tool (starting with v2020.2) includes the assignment of a default CCSR for the principal diagnosis.

The refinement process was informed by American Health Information Management Association-certified ICD-10-CM trainers and reviewed by a team of clinical experts. The team extensively reviewed the CCSR at each stage of its development using the HCUP State databases for quality control testing. This User Guide describes the CCSR and the downloadable software and documentation. Additional information on the refinement process is available in Appendix A: Background on the Development of the CCSR. The rationale used for selecting default CCSR categories for principal diagnoses are detailed in Appendix B: Default CCSR for Principal Diagnosis.

The CCSR for ICD-10-CM is updated annually to coincide with fiscal year updates to the ICD-10-CM diagnosis coding system and retains diagnosis codes valid from the start of ICD-10-CM in October 2015. For this reason, it is advisable to always use the most recent version of the tool. Released versions include the following:

- v2020.2 (released February 2020)
  - Added new category for back pain (total of 539 categories)
  - Added the assignment of the default CCSR for the principal diagnosis
  - Continues to include ICD-10-CM diagnosis codes valid from October 2015 through September 2019
- v2020.1 (released October 2019)
  - Added ICD-10-CM codes valid through September 2020
- v2019.1 (released September 2019)
  - Includes 538 categories
  - Includes ICD-10-CM diagnosis codes valid from October 2015 through September 2019.

Downloadable files for the CCSR for ICD-10-CM categories are available on HCUP User Support (HCUP-US) website.[1]

COMPARISON OF THE CCSR FOR ICD-10-CM DIAGNOSES, THE BETA VERSIONS OF THE CCS FOR ICD-10-CM, AND THE CCS FOR ICD-9-CM

There are several differences to note across the HCUP ICD-based diagnosis classification software: the CCSR for ICD-10-CM diagnoses, the beta versions of the CCS for ICD-10-CM diagnoses, and the CCS for ICD-9-CM diagnoses. Table 1 summarizes key differences. Additional details are provided in the following report available on the CCSR page of the HCUP-US website:

- *Comparison of the CCSR for ICD-10-CM diagnosis, v2019.1, to the beta version of the CCS for ICD-10-CM diagnosis, v2019.1*
- Companion Microsoft Excel file with comparisons by category and individual ICD-10-CM diagnosis code.

[1] The HCUP User Support website can be found at www.hcup-us.ahrq.gov/.

Table 1. Differences Between the CCSR for ICD-10-CM, CCS for ICD-10-CM, and CCS for ICD-9-CM

CCSR for ICD-10-CM Diagnoses	Beta Versions of the CCS for ICD-10-CM Diagnoses	CCS for ICD-9-CM Diagnoses
More than 70,000 ICD-10-CM codes are categorized into more than 530 categories	More than 70,000 ICD-10-CM codes are categorized into 283 categories	More than 14,000 ICD-9-CM codes are categorized into 283 categories
Valid for ICD-10-CM diagnosis codes from October 1, 2015 – September 30, 2020 (v2020.2) and updated annually for each fiscal year update to ICD-10-CM codes	Valid for ICD-10-CM diagnosis codes from October 1, 2015 – September 30, 2019 (v2019.1)	Valid for ICD-9-CM diagnosis codes through September 30, 2015
Capitalizes on the specificity of ICD-10-CM coding by creating new clinical categories that did not previously exist	Uses the same categories as previously available under CCS for ICD-9-CM diagnoses	283 CCS diagnosis and external cause of injury categories beginning in fiscal year 2008 after the CCS for Mental Health and Substance Use categories were permanently integrated into the CCS tool
Categories are organized into 21 body systems, generally following the ICD-10-CM diagnosis codebook chapters	Uses the same categories and order as previously available under CCS for ICD-9-CM diagnoses	Categories are ordered to generally follow the ICD-9-CM codebook across 17 chapters plus two supplementary classifications
Each ICD-10-CM code **maps to one or more** CCSR categories	Each ICD-10-CM code maps to one CCS category	Each ICD-9-CM code maps to one CCS category
Codes mapped to multiple CCSR categories include the assignment of a default CCSR for the principal diagnosis (starting with v2020.2)	Mutually exclusive categories facilitate ranking principal diagnoses categories	Mutually exclusive categories facilitate ranking principal diagnoses categories
No multi-level system with additional diagnostic specificity has been developed	Multi-level system with additional diagnostic specificity available for up to two levels	Multi-level system with additional diagnostic specificity available for up to four levels
SAS® programming code available. Comma separated values (CSV) mapping file available for use with other programming languages	SAS programming code available. CSV mapping file available for use with other programming languages	SAS and Stata® programming code available. CSV mapping file available for use with other programming languages
Allows users the flexibility to choose between output files structured horizontally or vertically. The vertical file structure improves storage efficiency.	Horizontal output only, one CCS data element for every diagnosis code.	Horizontal output only, one CCS data element for every diagnosis code.

Abbreviations: CCS, Clinical Classifications Software; CCSR, Clinical Classification Software Refined; CSV, comma separated values; ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification.

DESCRIPTION OF THE CCSR FOR ICD-10-CM

The Structure of the CCSR

The CCSR for ICD-10-CM diagnoses aggregates more than 70,000 ICD-10-CM diagnosis codes into a manageable number of clinically meaningful categories across 21 body systems, which generally follow the structure of the ICD-10-CM diagnosis chapters. Additional information on specific differences between the CCSR body systems and the ICD-10-CM diagnosis chapters is detailed in the next section (CCSR Guidelines). CCSR categories are organized by body system.[2] Each body system is abbreviated using a three-character scheme as shown in Table 2. Individual CCSR categories are numbered sequentially with the numbering scheme starting at "001" within each body system (i.e., there is a CCSR 001 for each body system). A complete listing of all CCSR categories and their associated descriptions can be found in the CCSR Reference File, available on the CCSR page of the HCUP-US website.

[2] The term "body system" is used to describe the organization of conditions within the CCSR tool. When referring specifically to the organization of codes within the ICD-10-CM codebook, we use the term "chapter."

Table 2. Three-Character Abbreviation for ICD-10-CM Body Systems[3]

ICD-10-CM Body System (largely aligned with ICD-10-CM chapters)	Three Character Abbreviation
Certain infectious and parasitic diseases	INF
Neoplasms	NEO
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	BLD
Endocrine, nutritional and metabolic diseases	END
Mental, behavioral and neurodevelopmental disorders	MBD
Diseases of the nervous system	NVS
Diseases of the eye and adnexa	EYE
Diseases of the ear and mastoid process	EAR
Diseases of the circulatory system	CIR
Diseases of the respiratory system	RSP
Diseases of the digestive system	DIG
Diseases of the skin and subcutaneous tissue	SKN
Diseases of the musculoskeletal system and connective tissue	MUS
Diseases of the genitourinary system	GEN
Pregnancy, childbirth and the puerperium	PRG
Certain conditions originating in the perinatal period	PNL
Congenital malformations, deformations and chromosomal abnormalities	MAL
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	SYM
Injury, poisoning and certain other consequences of external causes	INJ
External causes of morbidity	EXT
Factors influencing health status and contact with health services	FAC

Abbreviations: ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification

[3] The term “body system” is used to describe the organization of conditions within the CCSR tool. When referring specifically to the organization of codes within the ICD-10-CM codebook, we use the term “chapter.”

CCSR Assignment Guidelines

During the development of the CCSR, several guidelines were adopted to address common questions that the team encountered. The following sections describe the general guidelines that apply to all body systems as well as guidelines that are specific to an individual body system.

General Assignment Guidelines

1. The overarching goal of the CCSR is to categorize codes into a manageable number of clinically meaningful categories. The categories themselves should capture a clinical concept, and the codes within a specific category should maintain the clinical intent of that category. Although there was an attempt to keep the clinically meaningful categories from previous versions, there was no attempt to match the trends or utilization counts of the CCS for ICD-9-CM or the beta versions of the CCS for ICD-10-CM, even in cases in which the category title remains the same. Instead, the clinical concept guided the assignment of codes.
2. The number of catch-all categories (those that start with "Other specified") are minimized, because they are of limited value if the ICD-10-CM codes within the category are highly heterogeneous. When a catch-all category is necessary, the number of codes is minimized by separating out clinically relevant groups. This often is a trade-off with the number of overall categories created in the tool.
3. Different CCSR categories may include an overlapping set of codes, but no CCSR should be nested completely within another CCSR.
4. Every ICD-10-CM code is assigned to at least one CCSR category but can be assigned to multiple categories. Individual ICD-10-CM diagnosis codes can be used to document multiple conditions or a condition and a common symptom/manifestation. Assigning only one CCSR category to these codes would require prioritizing the assignment. Clinical coding guidelines were reviewed and considered when CCSR category assignments were made. Each code is mapped to no more than five categories and an attempt was made to minimize the number of assigned categories. In addition, when possible, a code is mapped to no more than one catch-all category.
    - Starting with the v2020.2, the CCSR includes the assignment of a default CCSR for the principal diagnosis. Additional information, including the rationale used in selecting default categories for principal diagnoses, is documented in Appendix B: Default CCSR for Principal Diagnosis.
5. Diagnosis codes are mostly retained in the chapters assigned by the World Health Organization[4] unless the clinical review team had a specific rationale for grouping the code only in another body system. For example, an ICD-10-CM code that is located in the Diseases and Disorders of the Circulatory System chapter of the codebook is assigned to at least one CCSR category in the *Diseases of the circulatory system* body

[4] Please see "The ICD-10-CM Tabular List of Diseases and Injuries" for details on the chapter assignments for ICD-10-CM codes (available at www.cdc.gov/nchs/icd/icd10cm.htm or www.cms.gov/Medicare/Coding/ICD10/).

system (i.e., the category begins with the characters “CIR”). There are a few notable exceptions[5] to this rule:

- ICD-10-CM codes for Periprosthetic fracture around internal prosthetic joint (i.e., codes starting with characters M97) are included in the *Injury, poisoning and certain other consequences of external causes* body system and not in the *Diseases of the musculoskeletal system and connective tissue* body system. This decision was made after consultation with injury experts at the Centers for Disease Control and Prevention (CDC).
- Several Mental, behavioral, and neurodevelopmental disorders codes (i.e., within the range of ICD-10-CM codes starting with characters F01–F99) related to the clinical concepts of neurocognitive disorders and sleep wake disorders are only mapped to categories in the *Diseases of the nervous system* body system so that they are categorized with similar clinical concepts.
- Several ICD-10-CM codes from the chapter on Symptoms, Signs and Abnormal Clinical and Laboratory Findings, Not Elsewhere Classified (i.e., ICD-10-CM codes starting with characters R01–R99) are included only under other body system categories because they aligned with specific conditions or disorders. For example, several R codes are exclusively assigned to a CCSR category within the *Diseases of the circulatory* body system. In contrast, codes that do not definitively indicate the presence of a condition or disorder (e.g., codes R78.0–R78.5 Finding of substance in blood) are retained within the body system of *Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified*.
- Several ICD-10-CM codes from the chapter on Factors Influencing Health Status and Contact with Health Services (i.e., ICD-10-CM codes starting with characters Z01–Z99) are included only under other body system categories because they aligned with specific conditions or disorders. For example, several Z codes are exclusively assigned to a CCSR category with codes under *Pregnancy, childbirth, and puerperium* or within *Certain conditions originating during the perinatal period* body systems. In contrast, codes that do not definitively indicate the presence of a condition or disorder (e.g., code Z79.891 long term (current) use of opiate analgesic and Z72.0 tobacco use) are retained within the body system of *Factors influencing health status and contact with health services*.

Body System-Specific Structure Notes and Exceptions to General Guidelines

1. The *Neoplasms* body system follows the National Cancer Institute (NCI)[6] organization of cancer types by body system and location whenever possible. In addition, the team sought guidance from cancer researchers on beneficial subcategories that go beyond the NCI structure, such as more specific leukemia categories.

[5] There are rare exceptions to this rule not covered by these explanations. Each exception code was identified by the American Health Information Management Association (AHIMA)-certified ICD-10-CM trainers and reviewed by the team of clinical experts before a final decision was made. In each case, the team agreed the best assignment for the ICD-10-CM code in question was only to a CCSR category in a different body system than the codebook chapter.

[6] See www.cancer.gov/ for additional information on the National Cancer Institute.

2. The *Mental, behavioral, and neurodevelopmental disorder* body system follows the organization of the American Psychiatric Association (APA) Diagnostic and Statistical Manual of Mental Disorders (DSM-5),[7] unless there was a specific reason to do otherwise. When questions arose regarding assignment of codes and categories, the ICD-11 classification system was consulted. Two exceptions are that the Neurocognitive disorders category (NVS011) and Sleep wake disorders category (NVS016)—which each contained codes from the Mental, Behavioral, and Neurodevelopmental Disorders chapter as well as the Diseases of the Nervous System chapter—were placed under the *Diseases of the nervous system* body system even though they are DSM-5 categories.
3. Codes in the *Congenital malformations, deformations and chromosomal abnormalities*, *Certain conditions originating during the perinatal period*, and *Pregnancy, childbirth, and puerperium* body systems are frequently, but not extensively, cross-classified to other body systems. The clinical review team believed that most researchers would be interested in either this specific set of congenital, perinatal, or pregnancy codes or the more general codes in the specific body system categories, but not both together. The conditions often are clinically and epidemiologically different, with unique treatment plans. There are exceptions to this decision, such as infectious diseases or critical chronic conditions such as hypertension and diabetes, in which users will observe codes cross-classified across these body systems.
4. The *Injury, poisoning and certain other consequences of external causes* and *External causes of morbidity* body systems follow the CDC Injury Mortality Diagnosis Matrix and the External Cause of Morbidity Matrix definitions for ICD-10-CM.[8] Additional categories were created to capture concepts not explicitly included in the CDC injury matrices or codes from other body systems that are not included in CDC definitions. See Appendix C for information on cross-referencing the CDC injury matrices to the CCSR for diagnoses.
5. Separate Injury categories were created to maintain the difference between poisoning, adverse effects, and toxic effects with respect to the occurrence of drug toxicity. The guidelines for ICD-10-CM coding[9] define these terms as follows:
    - "Adverse effect" is used when a drug has been properly prescribed and properly administered
    - "Poisoning" involves the improper use of medication
    - "Underdosing" refers to taking less of a medication than is prescribed by a provider or a manufacturer's instruction
    - "Toxic effect" occurs when a harmful substance is ingested or comes in contact with a person.
6. ICD-10-CM medical and surgical complication codes are located in CCSR categories on the basis of the chapter in which they are found in the ICD-10-CM codebook. This means that there are complication categories in 12 body systems.[10] Codes specifically

---

[7] Please see www.psychiatry.org/psychiatrists/practice/dsm for additional information on the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).
[8] Please see www.cdc.gov/nchs/injury/injury_tools.htm for additional details.
[9] Please see *ICD-10-CM Official Guidelines for Coding and Reporting FY 2020* (www.cdc.gov/nchs/data/icd/10cmguidelines-FY2020_final.pdf) for additional details.
[10] Diseases of the blood and blood forming organs and certain disorders involving the immune system (BLD); Diseases of the circulatory system (CIR); Diseases of the digestive system (DIG); Diseases of the

listed in sections with headers identifying complications (e.g., “intraoperative and postprocedural complications”, “complications in anesthesia during pregnancy”, “complications of labor and delivery”. “complication of device”, “complications predominantly related to the puerperium”, “complications of surgical and medical care”) in the ICD-10-CM codebook are assigned to a complication category.

7. Within the Pregnancy, childbirth and the puerperium body system, codes for complicating conditions are specified as occurring during pregnancy, childbirth, or the puerperium. When possible, these conditions are grouped into separate categories related to the timing of the complication. However, there is not enough information to distinguish this timing in all cases. If the complicating condition code does not specify the timing, it is placed in a category for other specified complications of pregnancy. This category can include complications that occur during pregnancy, childbirth, or the puerperium.

8. Codes that are described in the ICD-10-CM codebook with the keywords “infection,” “infectious,” or “infective” but are located in chapters other than Certain Infectious and Parasitic Diseases are cross-classified only to the *Certain infectious and parasitic disease* body system CCSR categories if there is a specified infection documented in the description. If no specific infection is documented, the code is not classified in a *Certain infectious and parasitic diseases* body system category. For example:
    - Code J20.0, Acute bronchitis due to mycoplasma pneumoniae, is assigned to RSP005 (Acute bronchitis) and INF003 (Bacterial infections)
    - Code J20.5, Acute bronchitis due to respiratory syncytial virus, is assigned to RSP005 (Acute bronchitis) and INF008 (Viral infection)
    - Code J20.9, Acute bronchitis, unspecified, is assigned only to RSP005 (Acute bronchitis) and not to a category within the *Certain infectious and parasitic diseases* body system.
9. Some categories in the CCSR for ICD-10-CM, such as those related to injury, include details on episodes of care. The CCSR for ICD-10-CM often separately classifies ICD-10-CM diagnoses indicating initial encounters, subsequent encounters, and sequela, where applicable.[11] A sequela is the residual effect (condition produced) after the acute phase of an illness or injury has terminated.[12] A sequela condition for an injury is a separate condition that arises during the treatment of the injury that needs its own treatment. A common example of a sequela condition is scar formation following a burn injury. The scar is the sequela condition and would be grouped with other scar conditions. A burn code with a seventh character of S indicates the injury responsible for the sequela condition and is assigned to the Injury; sequela encounter category. If a

---

ear and mastoid process (EAR); Endocrine, nutritional, and metabolic diseases (END); Diseases of the eye and adnexa (EYE); Diseases of the genitourinary system (GEN); Injury, poisoning and certain other consequences of external causes (INJ); Diseases of the musculoskeletal system (MUS); Diseases of the nervous system (NVS); Diseases of the respiratory system (RSP); Diseases of the skin and subcutaneous tissue (SKN).

[11] Although this approach results in a large number of injury categories, it is analytically easier for many users to combine categories than to disaggregate them.

[12] Please see *ICD-10-CM Official Guidelines for Coding and Reporting FY 2020* (www.cdc.gov/nchs/data/icd/10cmguidelines-FY2020_final.pdf) for additional details.

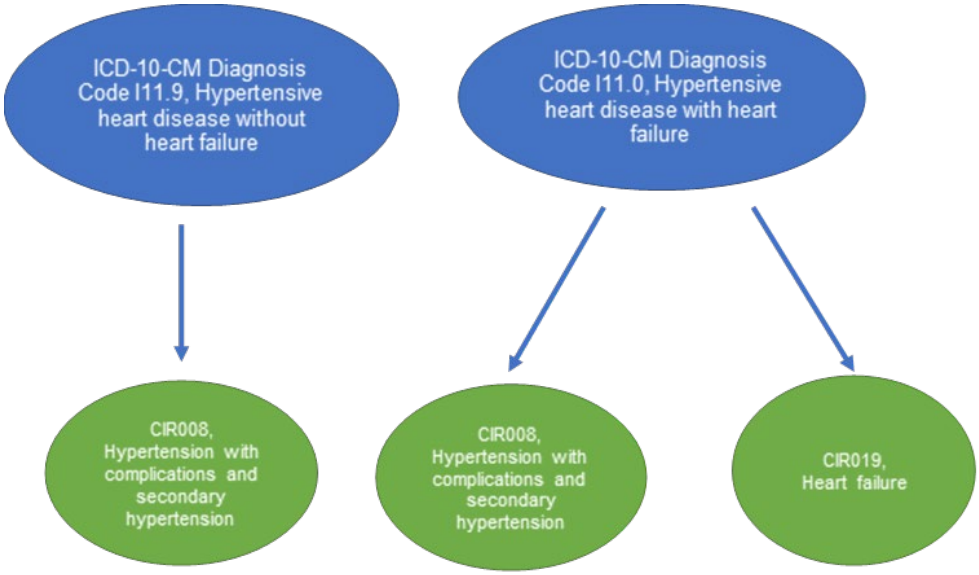
category contains a mix of codes with a seventh character indicating an initial encounter and codes that do not specify the episode of care, the category label does not specify an episode of care.

One-to-One and One-to-Many Mapping of ICD-10-CM Diagnosis Codes to CCSR

Why Cross-Classification of Codes are Necessary in the CCSR

Figure 1 provides a visual representation of how one-to-one and one-to-many mappings occur in the CCSR, using two ICD-10-CM diagnosis codes related to hypertension as examples. The ICD-10-CM diagnosis code I11.9, Hypertensive heart disease without heart failure, maps to a single CCSR category (CIR008 – Hypertension with complications and secondary hypertension), whereas ICD-10-CM diagnosis code I11.0, Hypertensive heart disease with heart failure, maps to two CCSR categories (CIR008 – Hypertension with complications and secondary hypertension and CIR019 – Heart failure).

Figure 1. Example of One-to-One and One-to-Many CCSR Mappings for Hypertension and Heart Failure



Abbreviations: CCSR, Clinical Classification Software Refined; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification.

Having code I11.0 mapped to two CCSR categories allows users to completely identify both hypertension cases and heart failure. The overarching goal of the CCSR, stated earlier, was to create clinically meaningful categories where the ICD-10-CM codes match the clinical intent of the category. The best way to accomplish that goal was to allow the coding and clinical review teams the flexibility to cross-classify individual codes into more than one CCSR category as necessary. Prevalence of Cross-Classified Codes in the CCSR

Every ICD-10-CM code is assigned to at least one CCSR category but can be assigned to multiple categories. Table 3 describes the distribution of CCSR category assignments in v2020.2.

Table 3. Type of CCSR Category Assignment by Number of ICD-10-CM Codes, v2020.2

Type of CCSR Category Assignment	Number of ICD-10-CM Codes (Percent of Total)
Codes assigned to only one category	64,952 (89.3%)
Codes assigned to two categories	5,813 (8.0%)
Codes assigned to three categories	1,567 (2.2%)
Codes assigned to four categories	362 (0.5%)
Codes assigned to five categories	21 (0.03%)
Total	**72,715 (100%)**

Abbreviations: CCSR, Clinical Classifications Software Refined; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification
Source: CCSR for ICD-10-CM diagnoses, v2020.2

Default CCSR for Principal Diagnosis

For some applications, a mutually exclusive categorization scheme is needed. Examples of research designs are:

- Distributing all dataset records into mutually exclusive groups
- Obtaining statistics on discharge-level or record-level outcomes or measures
- Performing rank utilization by principal diagnoses.

To facilitate these types of analyses, the CCSR tool (starting with v2020.2) includes the assignment of a default CCSR for the principal diagnosis. The rationale used in selecting default categories for principal diagnoses is documented in Appendix B: Default CCSR for the Principal Diagnosis. Users may choose to assign different default CCSR categories for ICD-10-CM codes, based on their own needs and preferences. For other applications, such as risk adjustment and the identification of comorbidities, the identification of all conditions related to a diagnosis code is beneficial.

Capitalizing on ICD-10-CM Diagnosis Coding Specificity

The previous section described how the specificity of ICD-10-CM diagnosis codes resulted in cross-classification of some codes in order to fully capture the clinical intent of CCSR categories. This section describes other ways the CCSR capitalized on the specificity of ICD-10-CM diagnosis codes to add value to the tool.

The CCSR tool also incorporates ICD-10-CM coding specificity by creating clinical categories not available in previous versions of the tool. The CCSR has nearly twice as many categories as the beta versions of the CCS for ICD-10-CM. All 21 body systems under the CCSR for ICD-10-CM have additional clinical categories as compared with the beta versions of the CCS, with the largest increases occurring in the *Injury, poisoning and certain other consequences of external causes* and *Neoplasms* body systems. Table 4 shows the number of CCSR categories and the number of CCS categories in the beta versions for ICD-10-CM for each body system.

Table 4. Number of CCSR and CCS (Beta Versions) Categories by Body System

Three-Character Body System Abbreviation	ICD-10-CM Body System Description	CCSR Categories, v2020.2	Beta Version CCS Categories, v2019.1
INF	Certain infectious and parasitic diseases	11	10
NEO	Neoplasms	74	37
BLD	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	10	6
END	Endocrine, nutritional and metabolic diseases	17	11
MBD	Mental, behavioral and neurodevelopmental disorders	32	15
NVS	Diseases of the nervous system	22	11
EYE	Diseases of the eye and adnexa	12	6
EAR	Diseases of the ear and mastoid process	6	3
CIR	Diseases of the circulatory system	39	26
RSP	Diseases of the respiratory system	17	13
DIG	Diseases of the digestive system	25	20
SKN	Diseases of the skin and subcutaneous tissue	7	4
MUS	Diseases of the musculoskeletal system and connective tissue	38	12
GEN	Diseases of the genitourinary system	26	20
PRG	Pregnancy, childbirth and the puerperium	30	21
PNL	Certain conditions originating in the perinatal period	15	7
MAL	Congenital malformations, deformations and chromosomal abnormalities	10	5
SYM	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	17	9
INJ	Injury, poisoning and certain other consequences of external causes	76	20
EXT	External causes of morbidity	30	21
FAC	Factors influencing health status and contact with health services	25	6

Abbreviations: CCS, Clinical Classifications Software; CCSR, Clinical Classifications Software Refined; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification
Source: CCSR for ICD-10-CM diagnoses, v2020.2 and beta version of the CCS for ICD-10-CM diagnoses, v2019.1

The following list provides a small subset of new categories available in the CCSR for each body system:[13]

- Certain infectious and parasitic diseases (INF) – fungal infections; foodborne intoxications
- Neoplasms (NEO) – six categories for different types of leukemia (chronic lymphocytic, acute lymphoblastic, acute myeloid, chronic myeloid, hairy cell, and all other types)
- Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (BLD) – nutritional anemia; hemolytic anemia; aplastic anemia
- Endocrine, nutritional and metabolic diseases (END) – diabetes mellitus type 1; diabetes mellitus type 2; obesity
- Mental, behavioral, neurodevelopmental disorders (MBD) – opioid-related disorders
- Diseases of the nervous system (NVS) – neurocognitive disorders; cerebral palsy
- Diseases of the eye and adnexa (EYE) – strabismus; refractive error
- Diseases of the ear and mastoid process (EAR) – diseases of the middle ear and mastoid (except otitis media); diseases of the inner ear and related conditions
- Diseases of the circulatory system (CIR) – chronic rheumatic heart disease; hypotension
- Diseases of the respiratory system (RSP) – sinusitis; pneumothorax
- Diseases of the digestive system (DIG) – gastrointestinal and biliary perforation; noninfective hepatitis
- Diseases of the skin and subcutaneous tissue (SKN) – pressure ulcer of skin; non-pressure ulcer of skin; contact dermatitis
- Diseases of the musculoskeletal system and connective tissue (MUS) – scoliosis and other postural dorsopathic deformities
- Diseases of the genitourinary system (GEN) – erectile disfunction; male infertility
- Pregnancy, childbirth and the puerperium (PRG) – anesthesia complications during pregnancy; maternal intrauterine infection
- Certain conditions originating in the perinatal period (PNL) – neonatal cerebral disorders; neonatal digestive and feeding disorders; neonatal abstinence syndrome; fetal alcohol syndrome
- Congenital malformations, deformations, and chromosomal abnormalities (MAL) – cleft lip or palate; chromosomal abnormalities
- Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (SYM) – dysphagia; abnormal findings without diagnosis
- Injury, poisoning and certain other consequences of external causes (INJ) – underdosing of drugs, initial encounter; toxic effects, initial encounter
- External causes of morbidity (EXT) – intent of injury, assault; poisoning by non-drug
- Factors influencing health status and contact with health services (FAC) – personal/family history of disease; resistance to antimicrobial drugs; organ transplant status

[13] See the CCSR Reference File for a complete list of categories in the CCSR. The CCSR Reference File is available on the CCSR page of the HCUP-US website (www.hcup-us.ahrq.gov/toolssoftware/ccsr/ccs_refined.jsp).

Episode of Care Coding in ICD-10-CM Diagnoses

ICD-9-CM codes did not include information on episodes of care for injuries or the trimester of specific pregnancy diagnosis codes. When the beta version of the CCS for ICD-10-CM diagnoses was developed, the categories were maintained from the CCS for ICD-9-CM.[14] Therefore, previous versions of the CCS tool did not distinguish between episodes of care or trimesters of pregnancy.

In contrast, ICD-10-CM coding for injuries often uses a seventh character to distinguish episodes of care. In most injury codes with episode of care coding, the options for the seventh character are initial encounter, subsequent encounter, and sequela.[15]

An initial encounter, designated by a seventh character of A, is the active treatment of the injury. Coding as an initial encounter does not depend on whether the encounter represents the first time the patient is seen by a healthcare provider. It depends only on receiving active treatment for the injury. In some cases, a patient may need to be stabilized before the active treatment may begin. Therefore, multiple encounters may be coded as an initial encounter for the same injury if active treatment is ongoing.

A subsequent encounter, designated by a seventh character of D, is used when the patient has completed active treatment and is receiving follow-up care after the injury. Subsequent encounters represent routine care during healing and recovery of the injury.

A sequela, designated by a seventh character of S, is the residual effect (condition produced) after the acute phase of an illness or injury has terminated.[16] A sequela condition for an injury is a separate condition that arises during the treatment of the injury that requires its own treatment.

Example of Episode of Care CCSR Categories

Table 5 illustrates how episode of care coding is incorporated into new CCSR categories for codes related to a fracture. Rows 1 and 2 represent codes indicating an initial encounter (seventh character of A and B) for treatment of a fracture, S42.022A and S42.022B. These

---

[14] See Appendix A: Background on the Development of the CCSR for additional details.

[15] ICD-10-CM codes for traumatic fractures have additional seventh character values. A–initial encounter for closed fracture; B–initial encounter for open fracture type I or II; C–initial encounter for open fracture type IIIA, IIIB, or IIIC; D–subsequent encounter for closed fracture with routine healing; E–subsequent encounter for open fracture type I or II with routine healing; F–subsequent encounter for open fracture type IIIA, IIIB, or IIIC with routine healing; G–subsequent encounter for closed fracture with delayed healing; H–subsequent encounter for open fracture type I or II with delayed healing; J–subsequent encounter for open fracture type IIIA, IIIB, or IIIC with delayed healing; K–subsequent encounter for closed fracture with nonunion, M–subsequent encounter for open fracture type I or II with nonunion, N–subsequent encounter for open fracture type IIIA, IIIB, or IIIC with nonunion, P–subsequent encounter for closed fracture with malunion, Q–subsequent encounter for open fracture type I or II with malunion, R–subsequent encounter for open fracture type IIIA, IIIB, or IIIC with malunion, S–sequela. These expanded options are aggregated as initial, subsequent, or sequela for the CCSR. The additional detail of the expanded codes is not incorporated. Please see *ICD-10-CM Official Guidelines for Coding and Reporting FY 2020* (www.cdc.gov/nchs/data/icd/10cmguidelines-FY2020_final.pdf) for additional details.

[16] Please see *ICD-10-CM Official Guidelines for Coding and Reporting FY 2020* (www.cdc.gov/nchs/data/icd/10cmguidelines-FY2020_final.pdf) for additional details and examples.

initial encounters include the active treatment of the fractures. Rows 3–6 show the same code with seventh characters of D, G, K, and P indicating subsequent encounters (ICD-10-CM codes S42.022D, S42.022G, S42.022K, and S42.022P). The subsequent encounters could be the removal of a cast. Row 7 is again the same code but with a seventh character of S indicating a sequela (ICD-10-CM code S42.022S). The sequela condition of the fracture may be ongoing pain.[17] If there is a sequela of the fracture, there would be both an ICD-10-CM code to indicate what the condition in need of treatment is (i.e., the malformation or pain) and the fracture sequela code to indicate the injury responsible for the sequela condition. In this example, there are three separate CCSR categories, one for each type of encounter. This is important because a researcher interested in the number of upper limb fractures may not want to include encounters for cast removal or ongoing pain. This separation of categories allows researchers to easily distinguish between the different types of encounters when using the CCSR to categorize injuries and other conditions with episode of care coding.

Table 5. Example of CCSR Categories for Episode of Care

Row	ICD-10-CM Code	ICD-10-CM Code Description	CCSR Category	CCSR Category Description
1	S42022A	Displaced fracture of shaft of left clavicle, initial encounter for closed fracture	INJ004	Fracture of the upper limb; initial encounter
2	S42022B	Displaced fracture of shaft of left clavicle, initial encounter for open fracture	INJ004	Fracture of the upper limb, initial encounter
3	S42022D	Displaced fracture of shaft of left clavicle, subsequent encounter for fracture with routine healing	INJ041	Fracture of the upper limb; subsequent encounter
4	S42022G	Displaced fracture of shaft of left clavicle, subsequent encounter for fracture with delayed healing	INJ041	Fracture of the upper limb, subsequent encounter
5	S42022K	Displaced fracture of shaft of left clavicle, subsequent encounter for fracture with nonunion	INJ041	Fracture of the upper limb, subsequent encounter
6	S42022P	Displaced fracture of shaft of left clavicle, subsequent encounter for fracture with malunion	INJ041	Fracture of the upper limb, subsequent encounter
7	S42022S	Displaced fracture of shaft of left clavicle, sequela	INJ073	Injury; sequela

Abbreviations: CCSR, Clinical Classifications Software Refined; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification
Source: CCSR for ICD-10-CM diagnoses, v2020.2

[17] Another common example of a sequela condition is scar formation following a burn injury. The scar is the sequela condition. A burn code with a seventh character of S indicates the injury responsible for the sequela condition.

Pregnancy Trimester Coding in ICD-10-CM Diagnoses

Many ICD-10-CM pregnancy codes (starting with characters O00–O99) have characters to indicate a specific trimester.[18] This is another example of code specificity that has been incorporated into the CCSR categories. Table 6 illustrates how trimester coding is incorporated into new CCSR categories. Each row represents code O26.85, Spotting complicating pregnancy, with a different final character indicating different trimesters of pregnancy. The CCSR categories for these codes separate hemorrhages into two groups, (1) first or unspecified trimester and (2) second or third trimester. This allows users to easily separate first trimester bleeding from second or third trimester bleeding.

Table 6. Example of CCSR Categories by Pregnancy Trimester

Row	ICD-10-CM Code	ICD-10-CM Code Description	CCSR Category	CCSR Category Description
1	O26851	Spotting complicating pregnancy, first trimester	PRG009	Early, first or unspecified trimester hemorrhage
2	O26852	Spotting complicating pregnancy, second trimester	PRG010	Hemorrhage after first trimester
3	O26853	Spotting complicating pregnancy, third trimester	PRG010	Hemorrhage after first trimester
4	O26859	Spotting complicating pregnancy, unspecified trimester	PRG009	Early, first or unspecified trimester hemorrhage

Abbreviations: CCSR, Clinical Classifications Software Refined; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification
Source: CCSR for ICD-10-CM diagnoses, v2020.2

Impact of New Clinical CCSR Categories on Users

The decision to create new CCSR categories unavailable in previous versions of the CCS enhances the ability for researchers to use the CCSR to identify more targeted patient populations. However, it does create a discontinuity for longitudinal trend analyses with previous versions of the CCS. Discontinuities in trend analyses are likely even for CCSR categories with similar descriptions or names to those in the CCS for ICD-9-CM, as the coding definitions of the categories may have changed.

Users wanting to look at trends should carefully analyze their data before and after the transition to ICD-10-CM to determine if additional statistical methods are necessary to address trend

[18] Although the majority of ICD-10-CM codes in the Pregnancy, Childbirth and the Puerperium chapter include trimester coding, the position of this character is not always the same. In other words, trimesters are not always indicated with the seventh character like episodes of care. However, trimester coding is indicated with the final character of pregnancy codes. Please see *ICD-10-CM Official Guidelines for Coding and Reporting FY 2020* (www.cdc.gov/nchs/data/icd/10cmguidelines-FY2020_final.pdf) for additional details and examples.

breaks introduced by ICD-10-CM coding and the differences between the CCS for ICD-9-CM and the CCSR for ICD-10-CM.

USING THE DOWNLOADABLE CCSR FILES

System Requirements

Using the CCSR for ICD-10-CM diagnoses requires a program to decompress or "unzip" files.[19] Approximately 2 megabytes of disk space available on one's hard drive also will be needed to accommodate all the CCSR files. Additional space is necessary for saving CCSR output files. See below for additional details on the options for CCSR output and the disk space considerations for each option.

Downloadable Files

The following files related to the CCSR for ICD-10-CM diagnosis are contained in a downloadable zip file:

1. Comma separated values (CSV) file that includes the mapping of ICD-10-CM diagnosis codes into CCSR categories with labels for the individual CCSR categories and the assignment of a default CCSR, where applicable
2. SAS program to apply the tool to the user's data
3. CCSR User Guide (PDF)
4. CCSR Reference File (Excel)
5. Change log from v2020.1 to v2020.2.

Table 7 includes additional detail on the names and purpose of the files included in the CCSR for ICD-10-CM diagnosis zip file.

[19] Third-party zip utilities are available from the following reputable vendors on their official websites: ZIP Reader (Windows) (free download offered by PKWARE, Inc.), SecureZIP® for Mac or Windows (free evaluation and licensed/fee software offered by PKWARE, Inc.), WinZip (Windows) (evaluation and fee versions offered by the Corel Corporation), Stuffit Expander® (Mac) (free evaluation and licensed/fee software offered by Smith Micro Software Inc.).

Table 7. Contents of the CCSR for ICD-10-CM Diagnoses Zip File

File Name	Purpose
$DXCCSR*yyyy-r*.csv where *yyyy* represents fiscal year and *r* represents a release number within fiscal year. For example, the first mapping file release to include codes valid through fiscal year 2020 is named $DXCCSR2020-1.csv.	The CSV mapping file lists ICD-10-CM diagnosis codes along with a description for each ICD-10-CM diagnosis code, the CCSR categories assigned, the full description corresponding to each CCSR category, and the default CCSR, where applicable. This is a *horizontal* file that the SAS program uses as input to build the tool. The term horizontal is used because each individual ICD-10-CM diagnosis code is listed once (on a single row) with the information on the CCSR categories listed across the columns of the CSV file. This file can be converted to Excel where a filter can be applied to examine individual ICD-10-CM diagnosis codes or CCSR categories.
DXCCSR_Mapping_Program.sas	SAS mapping program applies the CCSR to the user's ICD-10-CM-coded data. The mapping program includes three options for the file structure of CCSR output.
DXCCSR-Reference-File-v*yyyy-r*.xlsx where *yyyy* represents fiscal year and *r* represents a release number within fiscal year	A reference file (Microsoft Excel) includes four tabs: (1) The first tab is a table of contents with links to the other tabs. (2) The second tab includes a list of the ICD-10-CM diagnosis chapters and the corresponding 3-character CCSR abbreviation for the body system. (3) The third tab includes a list of CCSR categories and numbers. (4) The fourth tab lists all ICD-10-CM diagnosis codes with descriptions, the assigned CCSR categories with descriptions, an indication of the default CCSR, where applicable, and the rationale for default assignment. A filter is applied to examine individual ICD-10-CM diagnosis codes or CCSR categories. This file differs from the CSV file in structure, but not in content. The mapping of the ICD-10-CM diagnosis codes to the CCSR categories is structured in a stacked (i.e. vertical) format, where cross-classified codes are listed in multiple rows for each different CCSR assignment.
DXCCSR-User-Guide-v*yyyy-r*.pdf where *yyyy* represents fiscal year and *r* represents a release number within fiscal year	This document (i.e., the User Guide for the CCSR in PDF format).
DXCCSR-ChangeLog-vyyyyr-vyyyyr.xlsx where *yyyy* represents fiscal year and *r* represents a release number within fiscal year	A log of changes (Microsoft Excel) between two versions of the CCSR software tool including lists of changes in categories and the mapping of ICD-10-CM codes into categories.

Abbreviations: CCSR, Clinical Classifications Software Refined; CSV, comma separated values; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification

Flexible File Structure for Outputting the CCSR for ICD-10-CM Diagnoses

Within the SAS mapping program, users are given three options for the file structure of their output once the CCSR tool is applied to the data. The programs assume that the input file will have one record per encounter (inpatient stay, emergency department visits, etc.) with a unique record identifier and an array of ICD-10-CM diagnosis codes. There is no restriction on the maximum length of the input diagnosis array. Users can modify the SAS code to match the structure of their data.

Output Option 1, Vertical Output File

By default, the SAS program creates a "vertical" file with one or more observations (i.e., rows) for each input record. The number of observations created from each input record depends on the number of CCSR categories triggered by the ICD-10-CM diagnoses on the input record. For example, if an input record has only one ICD-10-CM diagnosis code and that code maps to two CCSR categories, the vertical file for that input record would have two observations to display the CCSR records. If an input record has ten diagnosis ICD-10-CM diagnosis codes and they each map to just one CCSR category, the vertical file for that record would have ten observations to display the CCSR records.

The vertical file contains four data elements (i.e., columns):

- The record identifier (data element RECID)
- A CCSR category (data element DXCCSR)
- The diagnosis position (data element DX_Position) which indicates which ICD-10-CM diagnosis code on the record triggered the CCSR category assignment
- An indicator for whether the CCSR category represents the default CCSR for the principal diagnosis on the record (data element DEFAULT_DXCCSR) with values Y indicating the category is the default CCSR, N indicating the category is not the default, and X indicating that the diagnosis is not valid as a principal diagnosis according to ICD-10-CM coding guidelines.

The vertical file option affords users more efficient storage—about 20 bytes per record. It also maintains information on the exact position of the ICD-10-CM diagnosis that triggered the CCSR category as well as identifies the default CCSR category for the principal diagnosis on the record. However, because this option outputs multiple observations corresponding to a single input record and a single diagnosis code, its practical application may be challenging for users with limited statistical programming experience.

Output Option 2, Horizontal Array of all CCSR Categories

Users also can specify the SAS mapping program to create a horizontally structured CCSR output file. The output file will indicate which CCSR categories are triggered by the ICD-10-CM diagnoses but does not include information on the default diagnosis for the principal diagnosis. If this option is selected, the SAS program creates a file with only one observation (i.e., row) for each input record that includes the record identifier and a horizontal array of over 530 data elements corresponding to the CCSR categories. There is one data element for each CCSR category, with the data element name corresponding to the CCSR category along with a "DXCCSR_" prefix, where DX stands for diagnosis. For example, the data element name for the CCSR category for Essential hypertension is "DXCCSR_CIR007".

The horizontal file option allows users to differentiate between the principal diagnosis, secondary diagnoses, or both types of diagnoses but does not retain the exact position of the ICD-10-CM diagnosis on the record in the input data file. The SAS program assigns one of four values for each DXCCSR data element:

- 0 – The CCSR was not triggered by any ICD-10-CM diagnosis code on the input record.
- 1 – The CCSR was triggered by only the principal (or first-listed diagnosis) on the input record.
- 2 – The CCSR was triggered by both the principal (or first-listed diagnosis) and any secondary diagnosis on the input record.
- 3 – The CCSR was triggered by only secondary diagnosis code(s) on the input record.

The SAS program produces a SAS data set with the following data elements:

- RECID – A record identifier
- Horizontal array of over 530 “DXCCSR_” data elements

This option is conceptually straightforward for analyses because all CCSR categories triggered by diagnoses on a record are kept at the record level without further transformation. However, the horizontal structure includes a data element for every CCSR category, and as a result, it retains CCSR categories that are not triggered by a record. Each record of horizontal output takes up approximately 1.5 KB disk space, potentially presenting computational or data storage challenges for users with large datasets or limited disk space.

Output Option 3, Optional File with Default Assignment for Principal Diagnosis

Users also can specify the SAS mapping program to create an optional separate output file that includes one observation per each input record and the default CCSR category for the principal diagnosis.

The optional file contains two data elements (i.e., columns):

- The record identifier (data element RECID)
- The default CCSR category for the principal diagnosis (data element DEFAULT_DXCCSR_DX1)

This file easily can be merged with the original input file by RECID and then be used to count hospital encounters by principal diagnosis CCSR without double counting.

Example of Output from the Three Different Output Files

Table 8 displays a sample input record, where four ICD-10-CM diagnoses are stored in an array of data elements I10_DX1–I10_DX4 for a record with RECID equal to 1234. The following three tables display the different output file formats. Table 9 displays the vertical file output for this sample input record. Table 10 contains an example of the horizontal output file, using the same sample input record. Table 11 contains an example of the optional output file for the default CCSR for the principal diagnosis, again using the same sample input record.

Table 8. Sample of Input File Record

RECID	I10_DX1	I10_DX2	I10_DX3	I10_DX4
1234	E1122	N184	M84664A	M80862A

Table 9. Example of the Vertical Output File for the Sample Record

Row	RECID	DXCCSR	DX_POSITION	DEFAULT_DXCCSR
1	1234	END003	1	Y
2	1234	END005	1	N
3	1234	GEN003	1	N
4	1234	GEN003	2	
5	1234	MUS014	3	
6	1234	MUS013	4	
7	1234	MUS014	4	

The first row of Table 9 indicates that the first diagnosis code (DX_POSITION=1) for RECID 1234 is cross-classified into three CCSR categories listed in rows 1–3: END003–Diabetes mellitus with complication, END005–Diabetes mellitus, Type 2, and GEN003–Chronic kidney disease (DXCCSR=END003, END005, and GEN003 and DX_POSITION=1). END003 is the default CCSR for the first diagnosis code and is assigned the value “Y” for DEFAULT_DXCCSR. The other cross-classified codes for the first diagnosis are assigned the value "N” indicating that neither END005 nor GEN003 are the default CCSR categories for this diagnosis code.

The second diagnosis code maps to only one CCSR listed in row 4, GEN003 – Chronic kidney disease that is triggered also by the principal (or first-listed) diagnosis. The third diagnosis also maps to only one CCSR listed in row 5 (DXCCSR=MUS014 and DX_POSITION=3). The fourth diagnosis code (Rows 6–7 in Table 9) is cross-classified into two CCSR (DXCCSR=MUS013 and MUS014 and DX_POSITION=4). All secondary diagnoses on this sample input record have a “blank” value for DEFAULT_DXCCSR given that default assignment is only applicable to the principal (or first-listed) diagnosis.

In the example of the horizontal output file (Table 10) the fact that both the principal (or first-listed) diagnosis and a secondary diagnosis trigger GEN003 results in data element DXCCSR_GEN003 being assigned the value 2. DXCCSR_END003 and DXCCSR_END005 are only triggered by the principal (or first-listed) diagnosis on the sample record and therefore assigned the value 1.DXCCSR_MUS013 and DXCCSR_MUS014 are assigned the value 3 because they are triggered by secondary diagnoses only (i.e., data elements I10_DX3 and I10_DX4 in Table 8). Data element DXCCSR_BLD001 and DXCCR_SYM017 (as well as all other “DXCCSR_” data elements not shown in Table 10) are assigned the value 0 because they are not triggered by any ICD-10-CM diagnosis codes on the input record.

Table 10. Example of Horizontal Output File

RECID	DXCCSR_BLD001	...	DXCCSR_END003	…	DXCCSR_END005	…	DXCCSR_GEN003	…	DXCCSR_MUS013	DXCCSR_MUS014	…	DXCCSR_SYM017
1234	0		1		1		2		3	3		0

The optional output file for the default CCSR for principal diagnosis will only have one row per input record, pertaining to the principal (or first-listed) diagnosis. In the sample input record above, the first diagnosis code is cross classified to three CCSR categories, but the default for the principal diagnosis is END003, which is listed as the value for DEFAULT_DXCCSR_DX1.

Table 11. Example of the Optional Output File for Default Assignment for the Principal Diagnosis

RECID	DEFAULT_DXCCSR_DX1
1234	END003

Representation of ICD-10-CM Diagnosis Codes

ICD-10-CM diagnoses often are represented by 4- to 7-digit alphanumeric codes with explicit decimals. In the CSV mapping file, the ICD-10-CM diagnosis codes are enclosed in quotation marks and do not contain decimals. In addition, the SAS program that assigns the CCSR, ICD-10-CM codes are expected to be 7-digit alphanumeric character strings with implicit decimals. Table 12 provides examples for how the ICD-10-CM diagnosis codes are represented in the CSV mapping file and expected by the SAS program.

Table 12. Example of Representation of ICD-10-CM Diagnosis Codes in the CCSR for ICD-10-CM

Condition	ICD-10-CM Diagnosis Code	Alphanumeric Code (With Implicit Decimals) in the CSV File
Single liveborn infant, delivered vaginally	Z38.00	‘Z3800 ’
Sepsis, unspecified organism	A41.9	‘A419 ’
Pneumonia, unspecified organism	J18.9	‘J189 ’

Abbreviations: CCSR, Clinical Classifications Software Refined; CSV, comma separated values; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification

For the accurate assignment of CCSR, the ICD-10-CM diagnosis codes in the input files must be reported as follows:

- Alphanumeric diagnosis codes must be left-justified, allowing trailing blanks to fill up the full length of 7 characters.
    - Example: Diagnosis J18.9 should be retained as 'J189 ' in the input file.
- Trailing blanks should never be zero-padded.
    - Example: Diagnosis 'J189 ' should *not* be represented as 'J189000'.
- Only fully specified ICD-10-CM codes should be included. The CCSR software does not account for substrings or parent codes, such as three-digit code blocks
    - Example: Diagnosis E11 (Type 2 diabetes mellitus) or E11x cannot be used to capture all codes that begin with the characters E11.

Running the SAS Program to Add CCSR Categories to Data

To download, modify, and run the software to apply the CCSR for ICD-10-CM diagnoses to an input dataset, follow these steps:

1. Users should download and extract the contents of the zip file containing the CSSR for ICD-10-CM diagnosis tool to a saved location on their computer. Files included in the zip file are described in Table 7 and referenced below.
2. Users must set up the SAS program (DXCCSR_Mapping_Program.sas) to run on their data. They must specify or modify the following where appropriate:
    a. Change the paths in the SAS program to point to the computer location(s) of
        i. the CSV mapping file ($DXCCSR*yyyy-r*.csv)
        ii. the input dataset
        iii. the output dataset
    b. Set the macro variables in the SAS program to match the data element names and file structure of the input dataset (see Table 12).

Table 13. Modifiable Macro Variables and Directory Paths

Description of Macro Variables and Directory Paths	SAS Program Syntax
Location of the CSV mapping file	FILENAME INRAW1
Specify the location of the input dataset	LIBNAME IN1
Specify the location of the output dataset(s)	LIBNAME OUT1
Choose whether to have the program to build the default CCSR output file (1=yes, 0=no). The vertical output file is always built by the SAS program	%LET DFLT=1;
Choose whether to have the program to build the horizontal output file (1=yes, 0=no). The vertical output file is always built by the SAS program	%LET HORZ=1;
Specify the unique record identifier in the input dataset (KEY in most HCUP databases)	%LET RECID=KEY;

Description of Macro Variables and Directory Paths	SAS Program Syntax
Specify the prefix used to name the ICD-10-CM diagnosis data element vector of the input dataset (I10_DX in HCUP databases)	%LET DXPREFIX=I10_DX;
Specify the data element, if available, that documents the number of diagnoses on each specific record. This will improve processing efficiency. If such a data element is not available in the input dataset, leave this macro blank and the logic will use the NUMDX value for all records	%LET NUMDX=30;
Record-specific count of diagnoses (if not available, leave it blank; I10_NDX in HCUP databases)	%LET NDXVAR=I10_NDX;
Specify the file name of the input dataset	%LET CORE=INPUT_SAS_FILE;
Specify a file name for the vertical output file	%LET VERTFILE=OUTPUT_VERT_FILE_NAME;
Specify a file name for the horizontal output file	%LET HORZFILE=OUTPUT_HORZ_FILE_NAME;
Specify a file name for the default CCSR output file	%LET DFLTFILE=OUTPUT_DFLT_FILE_NAME;

Abbreviation: CSV, comma separated values

After running of the SAS mapping program, three output datasets could be generated:

1. A vertical file with record identifier (data element RECID), CCSR category (data element DXCCSR), and the position of the diagnosis (data element DX_Position). In this file, each record identifier RECID is output multiple times to match the number of diagnosis codes present on the record.
2. A horizontal file with record identifier (RECID), categorical data elements DXCCSR_BBBnnn for the array of all CCSRs. “BBBnnn” are the values of CCSR categories. In this file, there is one observation for each input record. See the CCSR Reference File for specific names and descriptions of the CCSR categories.[20]
3. A file with record identifier (RECID) and the default CCSR category applicable to the principal diagnosis for that record (Default_DXCCSR_DX1). In this file, there is one observation for each input record.

[20] See the CCSR Reference File for a complete list of categories in the CCSR. The CCSR Reference File is only available on the CCSR page of the HCUP U-St website (www.hcup-us.ahrq.gov/toolssoftware/ccsr/ccs_refined.jsp).

APPENDIX A: BACKGROUND ON THE DEVELOPMENT OF THE CCSR

In October 2015, the United States transitioned to a modified version of the World Health Organization International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM), replacing the ICD-9-CM diagnosis coding system with the ICD-10-CM diagnosis coding system for most inpatient and outpatient medical encounters. An overview of differences between ICD-10-CM and ICD-9-CM is available on the HCUP User Support website at www.hcup-us.ahrq.gov/datainnovations/icd10_resources.jsp.

Impact on the Clinical Classifications Software

In preparation for the October 2015 implementation of ICD-10-CM, the Healthcare Cost and Utilization Project (HCUP) tools were converted to the new coding system. The initial mapping was completed by linking ICD-10-CM/PCS (Procedure Coding System) codes to the current Clinical Classifications Software (CCS) Agency for Healthcare Research and Quality (AHRQ) classification assignments via the General Equivalence Mappings (GEMs) available from the Centers for Medicare & Medicaid Services (CMS) website (see http://www.cms.gov/Medicare/Coding/ICD10/2014-ICD-10-CM-and-GEMs.html for more information on GEMS). The GEMs files were processed to create GEMs-driven maps between ICD-9-CM and ICD-10-CM codes. Credentialed coders trained in both ICD-9-CM and ICD-10-CM reviewed the maps to ensure the validity of the CCS. The goal of the team was to create a set of clinical coding definitions that matched the categories in the CCS for ICD-9-CM and would ease the transition of users from ICD-9-CM- to ICD-10-CM-coded data. The CCS categories remained the same, although some categories received slight naming modifications to remain accurate descriptions for the codes included in ICD-10-CM. The resultant first iteration of the ICD-10-CM classification was considered a beta version.

However, the development of the beta version of the CCS for ICD-10-CM was completed before ICD-10-CM-coded data became available. Once ICD-10-CM coded data became available, the beta version of the CCS was evaluated through preliminary analyses on HCUP data, which revealed unexpected discontinuities between the ICD-9-CM and ICD-10-CM versions of the CCS. These initial analyses encouraged AHRQ to reconsider the need for a refined ICD-10-CM version of the CCS.

Refinement of the Beta Versions of the CCS

In January 2018, AHRQ initiated planning for a refined version of the CCS, the Clinical Classifications Software Refined (CCSR) for ICD-10-CM diagnosis, which would take advantage of the specificity built into ICD-10-CM codes. The new goal was to create a CCS tool that prioritized defining the codes in each category to match the clinical intent of the category description. To adequately map the codes to clinically meaningful categories, it was important to have expert input from a coding and a clinical perspective from a variety of specialties.

The team first discussed and debated the intricacies and specificity of ICD-10-CM coding, shortcomings of the existing beta versions of the CCS tool, and potential revisions and modifications that could be implemented in a new diagnosis categorization tool. AHRQ staff reviewed the team's recommendations and made overarching decisions about the structure and design of the tool. The new CCSR tool was not restricted to include the same set of categories as the beta versions of the CCS tool, but rather the team was tasked with creating a set of categories that were identifiable in ICD-10-CM codes and valuable for health services research. Many categories were maintained from the beta versions of the CCS for ICD-10-CM with the

clinical concept retained, but the specific ICD-10-CM diagnoses included in the category may have been revised. The coding and clinical review teams were encouraged to create new categories or disaggregate existing categories when they identified opportunities to increase the value of the tool to health services researchers.

The most substantial change to the CCSR for ICD-10-CM compared with the beta versions of the CCS for ICD-10-CM diagnosis is that individual categories no longer contain a mutually exclusive set of ICD-10-CM codes. ICD-10-CM codes under the CCSR are mapped to at least one category but can be mapped to more than one category. Mutually exclusive category assignments have been a design feature of the CCS since its initial release (i.e., each ICD-9-CM diagnosis code was included in one and only one CCS category). However, individual ICD-10-CM diagnosis codes can be used to document multiple conditions or a condition and a common symptom or manifestation. Assigning only one CCS category for these codes would require prioritizing the assignment (and the preferred hierarchy of conditions might be different for different applications). An overarching goal of the CCSR was to create clinically meaningful categories where the ICD-10-CM codes match the clinical intent of the category. The best way to accomplish that goal was to allow the coding and clinical review teams the flexibility to cross-classify individual codes into more than one CCSR category as necessary. However, for some applications, such as ranking hospitalizations by the principal diagnosis, a mutually exclusive categorization scheme is needed. To facilitate this type of analysis, the CCSR tool (starting with v2020.2) includes the assignment of a default CCSR for the principal diagnosis.

Refinement Review Process

During the development of the CCSR, the coding definitions for each existing and proposed new category were reviewed thoroughly. The team worked through the set of ICD-10-CM codes and CCSR categories in groups organized by body system or ICD codebook chapter. This structure was retained in the final CCSR tool so that related categories would be easier to identify and so that future revisions to the CCSR would allow new categories to be inserted in a relevant section, rather than being relegated to the end of the category listing.

Within each body system, an American Health Information Management Association (AHIMA)-certified ICD-10-CM/PCS trainer suggested a set of relevant categories and assigned individual ICD-10-CM codes to each category. Each assignment was reviewed by a second AHIMA-certified ICD-10-CM/PCS trainer who checked for completeness, appropriate categorization for each code, and recognition of both specific codebook directions and published coding guidelines. Review from a third AHIMA-certified ICD-10-CM/PCS trainer was available to reconcile differences in assignment by the first two coders. Following the initial code assignments for each body system, a team of three physicians on the clinical review team also reviewed all categories and code assignments. The clinical team answered specific questions posed by the ICD-10-CM coders, such as whether to create a new category to capture a specific condition group. When necessary, specialty physicians were identified and called on to add body system specific expertise.

Following clinical review, AHRQ provided additional oversight and guidance. AHRQ staff continued to consult the expertise of the ICD-10-CM coders, the physicians, and other researchers to resolve any outstanding issues or decision points. The review process included multiple iterations of review and refinements. The team conducted various tests of the CCSR tool to identify potential improvements and modifications after its initial build with the aim of a more parsimonious set of categories. These tests resulted in additional cross-listings of codes

across categories, creating new categories, renaming categories, combining or rolling up categories, and/or shifting categories from one body system to another. Such changes were the result of extensive input across multiple organizations and clinical specialties that evaluated the CCSR category assignments for accuracy and clinical significance. The team extensively reviewed the CCSR tool at each stage of its development, using HCUP State Inpatient Databases (SID) from multiple States and years for some quality control testing. The team reviewed utilization counts of CCSR categories and individual ICD-10-CM codes, cross-tabulations by patient demographic characteristics, and correlation with Major Diagnostic Category and Medicare-Severity Diagnosis Related Group assignment. These tabulations were for informational purposes and assisted in further refinements, but there was not effort made to perfectly align the CCSR categories with MDCs and MS-DRGs, as the purpose of the classifications systems vary (i.e., CCSR is intended to assist in answering health research and policy questions, while MDCs and MS-DRGs are intended to assist with reimbursement). The ICD-10-CM coders identified all ICD-10-CM codes not categorized in body systems that match their codebook chapter location and reviewed the mapping assignments across body systems to ensure consistency with the CCSR category assignment rules.

APPENDIX B: DEFAULT CCSR FOR THE PRINCIPAL DIAGNOSIS

Introduction

The Agency for Healthcare Research and Quality (AHRQ) has created a supplemental default categorization scheme for the CCSR that can be used in analyses of principal (or first-listed) diagnosis. Under this default categorization scheme, each ICD-10-CM diagnosis code is assigned to a mutually exclusive category. In general, the default assignment is based on clinical coding guidelines,[21] clinical input on the etiology and pathology of diseases, coding input on the use of and ordering of ICD-10-CM codes on a billing record, and standards set by other Federal agencies.

During development of the default category assignments, the same clinical review team that made the initial CCSR category assignment recommendations provided clinical recommendations on assigning a default category. The group recommended potential assignment rules (referred to as rationales) and reviewed which rationale would apply to the cross-classified ICD-10-CM codes. After thorough discussion, the group decided on a final set and ordering of rationales. Users may choose to assign different default CCSR categories for ICD-10-CM codes, based on their own needs and preferences. It is not recommended that this default categorization scheme be used for other applications such as analyses based on all-listed diagnoses on a billing record, risk adjustment, and the identification of comorbidities. For these analyses, AHRQ recommends using the cross-classified CCSR categories.

The default CCSR categorizations are part of the CSV mapping file beginning with v2020.2 of the CCSR for ICD-10-CM diagnoses. The guidelines for determining the default CCSR are ordered in a hierarchical fashion. If a code does not fit the first rationale, then the next rationale is considered, and so forth until an appropriate rationale is determined. The default categorizations chosen by AHRQ will not apply to all situations. Users may choose to assign different default CCSR categories for ICD-10-CM codes that are cross-classified, based on their own reporting purpose, research design, study purpose, or clinical preferences.

The selection of a default CCSR for the principal diagnosis is not applicable in two instances. First, there are ICD-10-CM diagnosis codes that are not to be reported as a principal diagnosis according to ICD-10-CM coding guidelines. These codes do not have a default categorization assigned. Their default categorization is indicated by the CCSR category XXX000 with the rationale of “Invalid PDX”. Included in this group are external causes of morbidity codes (i.e., codes beginning with V00–Y99), underdosing codes (i.e., codes beginning with T36–T50 with fifth or sixth character “6”), injury codes indicating a sequela encounter (i.e., codes beginning with ‘T’ and ending in ‘S’), and maternal outcome of delivery codes (i.e., codes beginning with Z37). Second, for diagnosis codes assigned to only one CCSR category, the default CCSR is the same as the assigned category. In this case, the rationale is noted as “Not Applicable”. Table B.1 enumerates the number of ICD-10-CM codes by the type of default CCSR assignment.

[21] Please see ICD-10-CM Official Guidelines for Coding and Reporting FY 2020 (www.cdc.gov/nchs/data/icd/10cmguidelines-FY2020_final.pdf) for additional details.

Table B.1. Type of Default CCSR Assignment by Number of ICD-10-CM Codes, v2020.2

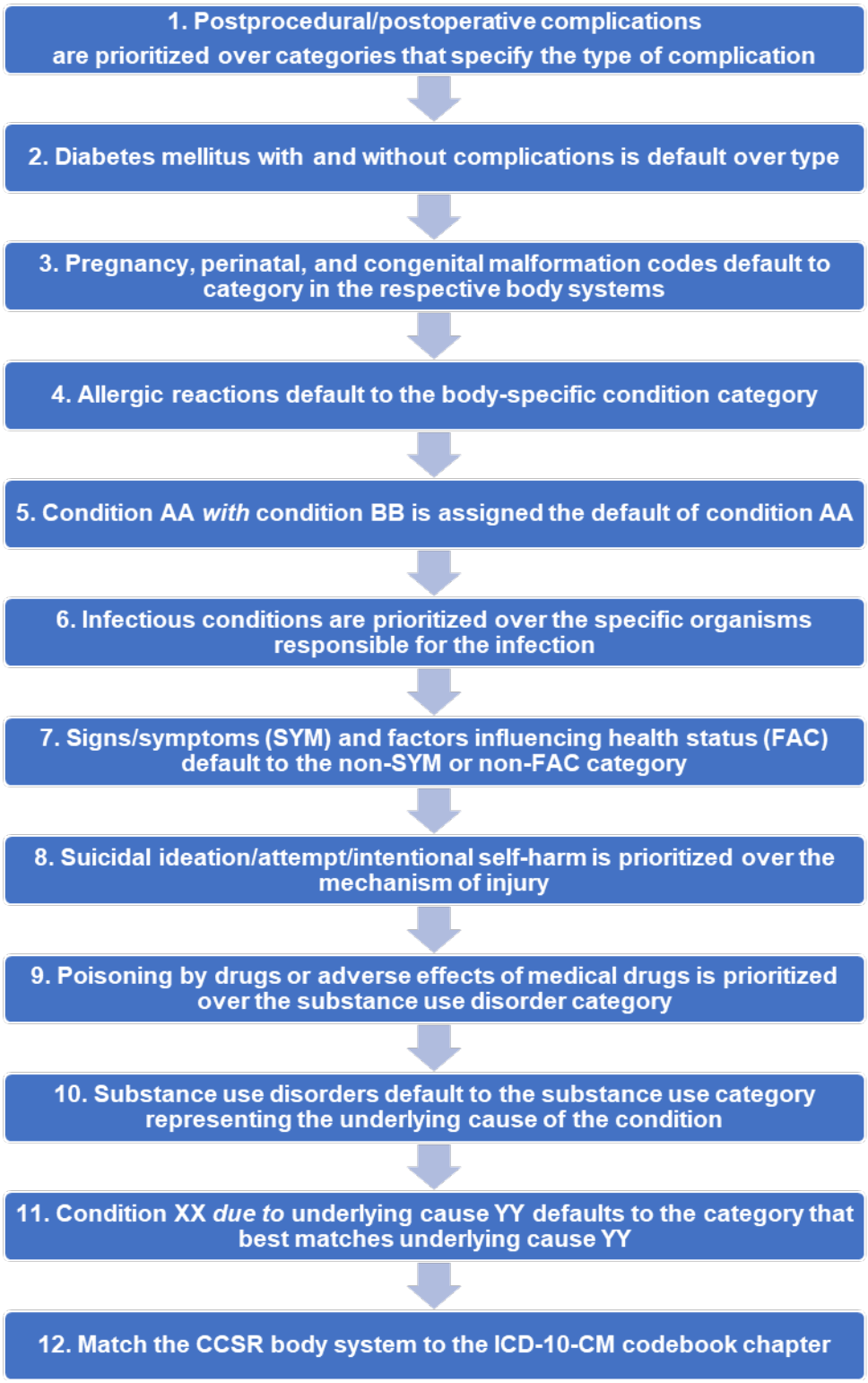
Type of ICD-10-CM Code in CCSR	Number of ICD-10-CM Codes (Percent of Total)
All ICD-10-CM codes through FY 2020	72,715 (100%)
Codes that are not to be reported as a principal diagnosis (according to ICD-10-CM coding guidelines)	7,435 (10.2%)
Codes classified by only one CCSR category (and the code is a valid principal diagnosis)	60,195 (82.8%)
Codes classified into a default CCSR category for the principal diagnosis	5,085 (7.0%)

Abbreviation: CCSR, Clinical Classifications Software Refined; ICD-10-CM, International Classification of Diseases, 10th revision, Clinical Modification; FY, fiscal year.
Source: CCSR for ICD-10-CM diagnoses, v2020.2

Guidelines for Determining the Default CCSR for the Principal Diagnosis

The guidelines are ordered in a hierarchical fashion. If a code does not fit the first rationale, then the next rationale is considered, and so forth until an appropriate rationale is determined. Counts of codes are specific to CCSR, v2020.2. Figure 2 provides an overview of the guidelines followed by a detailed description of each guideline.

Figure 2. Hierarchical Guidelines for Assignment of Default CCSR for the Principal Diagnosis



1. **Postprocedural or postoperative complications are prioritized over categories that specify the type of complication (N=90 codes):** Codes mapped to a postprocedural or postoperative complication category, default to the postprocedural CCSR categories over other categories that specify the type of complicating condition. For example, the ICD-10-CM code for postprocedural hypothyroidism has the default CCSR of END014 (Postprocedural or postoperative endocrine or metabolic complication) instead of END001 Thyroid disorders. Similarly, priority is given to categories that identify the underlying cause of a condition as being due to or related to neoplasms or the treatment of neoplasms. For example, the ICD-10-CM code for anemia in neoplastic disease has the default CCSR of NEO074 (Conditions due to neoplasm or the treatment of neoplasm) instead of BLD003 (Aplastic anemia).

2. **Diabetes mellitus with and without complications is default over type of diabetes (N=464 codes):** END002 (Diabetes mellitus without complication) or END003 (Diabetes mellitus with complication) are the default categories when cross-classified with END004-END006 (Diabetes mellitus, Type 1; Diabetes mellitus, Type 2; Diabetes mellitus, due to underlying condition, drug or chemical induced, or other specified type). For example, diagnoses for diabetes that specify the diabetic complication and Type 1 diabetes have the default CCSR of END003 (Diabetes mellitus with complication) instead of END004 (Diabetes mellitus, Type 1).

3. **Pregnancy, perinatal, and congenital malformation codes default to category in the respective body systems (N=396 codes):** Codes in the *Pregnancy, childbirth, and the puerperium*, *Certain conditions originating in the perinatal period*, and *Congenital malformations, deformations, and chromosomal abnormalities* body systems (i.e., PRG, PNL, or MAL), default to a category in those respective body systems when cross-classified with any of the other body systems. For example, diagnoses for pre-existing hypertensive heart and chronic kidney disease complicating pregnancy have the default CCSR of PRG020 (Hypertension and hypertensive-related conditions complicating pregnancy; childbirth; and the puerperium) instead of CIR008 (Hypertension with complications and secondary hypertension).

4. **Allergic reactions default to the body-specific condition category (N=72 codes):** Codes cross-classified to INJ031 (Allergic reactions), default to the body-specific condition category and <u>not</u> to allergic reactions. For example, the ICD-10-CM code for allergic contact dermatitis due to metals has the default CCSR of SKN005 (Contact dermatitis) instead of INJ031 (Allergic reactions).

5. **Condition AA *with* condition BB is assigned the default of condition AA (N=406 codes):** In general, code descriptions of “Condition AA *with* condition BB” follow a pattern that the underlying cause is listed as condition AA and the manifestation of that underlying cause is listed as condition BB. Therefore, in most cases, the default categorization priority is given to the category that best matches condition AA. For example, the ICD-10-CM code for acute gastric ulcer with perforation has the default CCSR of DIG005 (Gastroduodenal ulcer) instead of DIG006 (Gastrointestinal and biliary perforation).

There are some exceptions to the implementation of this guideline in the default categorization assignments. In certain cases, the manifestation listed as condition BB was far more severe relative to the underlying cause listed as condition AA. Alternatively, condition AA could be a chronic condition stably controlled for a large proportion of the population and condition BB more obviously indicates the acute reason for hospital care. For example, despite being listed as condition BB, CIR019 (Heart failure) and GEN003 (Chronic kidney disease) are both default categories over CIR008 (Hypertension with complications and secondary hypertension). Similarly, CIR020 (Cerebral infarction) is the default category over NVS010 (Headache; including migraine).

For codes that begin with M05, rheumatoid arthritis is considered the underlying cause of the conditions even though it is listed as condition BB. For these codes, MUS003 (Rheumatoid arthritis and related disease) is the default condition in all cases.

6. **Infectious conditions are prioritized over the specific organisms responsible for the infection (N=481 codes):** Infectious conditions are prioritized over the specific organisms responsible for the infection. Therefore, INF002 (Septicemia), INF007 (Hepatitis), and DIG001 (Intestinal infection) are default categories when cross-classified to another infectious and parasitic disease category (INF). For example, the diagnosis for sepsis due to streptococcus has the default CCSR of INF002 (Septicemia) instead of INF003 (Bacterial infections).

   ICD-10-CM codes A50-A64 default to INF010 (Sexually transmitted infections) due to the importance of tracking from a public health perspective unless the condition is congenital or likely an infection of a newborn acquired from mother at birth. INF007 (Hepatitis) is also the default category over MBD017 (alcohol-related disorders) because codes cross-classified into these categories specify that an additional code should be used to specify alcohol abuse and dependence.

7. **Signs/symptoms and factors influencing health status default to the other category (N=37 codes):** Codes cross-classified to a category in the *Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified* (SYM) body system or *Factors influencing health status and contact with health services* (FAC) body system as well as a category in another body system, default to the non-SYM or non-FAC category, respectively. For example, the diagnosis for drug induced fever has the default CCSR of INJ030 (Drug induced or toxic related condition) instead of SYM002 (Fever).

8. **Suicidal ideation/attempt/intentional self-harm is prioritized over the mechanism of injury (N=631 codes):** Codes identifying suicidal attempt/intentional self-harm (i.e., mapped to MBD012 or MBD027), default to those categories. These hospital encounters are critical to track accurately and are undercounted historically. For example, the diagnosis for poisoning by heroin, intentional self-harm, initial encounter has the default CCSR of MBD012 (Suicidal ideation/attempt/intentional self-harm) instead of INJ022 (Poisoning by drugs, initial encounter).

9. **Poisoning by drugs or adverse effects of medical drugs is prioritized over the substance use disorder category (N=166 codes):** Codes mapped to both a poisoning or adverse effects category in the *Injury, poisoning and certain other consequences of external causes* body system (INJ022, INJ028, INJ059, or INJ065) as well as a substance use disorder category in the *Mental, behavioral, and neurodevelopmental disorder* body system (MBD018-MBD025, MBD028-MBD033), default to the poisoning or adverse effects categories to align with the Centers for Disease Control and Prevention categorizations. For example, diagnosis for adverse effect of inhaled anesthetics, initial encounter has the default CCSR of INJ028 (Adverse effects of drugs and medicaments, initial encounter) instead of MBD023 (Inhalant-related disorders).

10. **Substance use disorders default to the substance use category representing the underlying cause of the condition (N=117 codes):** Codes mapped to both a substance use disorder category (MBD018-MBD025) and another category, default to the substance use category representing the underlying cause of the condition. The substance use category captures the underlying cause (e.g., opioids, alcohol, stimulants) and the other category captures the manifestation (e.g., delusions, hallucinations, anxiety). For example, the diagnosis for cannabis abuse with cannabis-induced anxiety disorder has the default CCSR of MBD019 (Cannabis-related disorders) instead of MBD005 (Anxiety and fear-related disorders).

11. **Condition XX *due to* underlying cause YY defaults to the category that best matches underlying cause YY (N=205 codes):** In general, code descriptions of "Condition XX *due to* YY" follow a pattern that the underlying cause is listed as YY (i.e., after the "due to") and the manifestation of that underlying cause is listed as condition XX. Therefore, in most cases, the default categorization priority is given to the category that best matches underlying cause YY. For example, the ICD-10-CM code for aplastic anemia due to other external agents has the default CCSR of INJ030 (Drug induced or toxic related condition) instead of BLD003 (Aplastic anemia).

    Similarly, codes describing conditions as "drug-induced" default to category INJ030 (Drug induced or toxic related conditions). When a code is cross classified into both MUS011 (Spondylopathies/spondyloarthropathy) and MUS038 (Low back pain), MUS011 is the default because the underlying cause takes precedence over the manifestation.

12. **Match the CCSR body system to the ICD-10-CM codebook chapter (N=2,020 codes):** This guideline for choosing a default category covers any remaining cases where the code is assigned to CCSR categories in at least 2 different body systems and can be separated into three scenarios.

    a. **Only one CCSR category matches the ICD-10-CM codebook chapter (N=1,412 codes):** In most of these cases, the default category assignment matches the ICD-10-CM codebook chapter of the diagnosis code. ICD-10-CM codebook chapter is determined by the first character (or sometimes the first and second characters) of the code. Code ranges and CCSR body system abbreviations for each chapter are listed in Table B.2.
    b. **Exception to match the CCSR body system to the ICD-10-CM codebook chapter (N=6 codes):** There are a small number of cases in which the body system category from the nonmatching codebook chapter captures the clinical intent of the codes in question better than the category with a matching body system. These exceptions are listed in Table B.3.
    c. **More than one CCSR category matches the ICD-10-CM codebook chapter (N=602 codes):** If there is more than one CCSR category that matches the ICD-10-CM codebook chapter, the code was reviewed by clinicians to determine which potential category was most appropriate to set as the default for the code in question.

Table B.2. ICD-10-CM Codebook Chapters Organization and CCSR Abbreviations

ICD-10-CM Codebook Chapter	Code Range of First Three Characters	CCSR Body System Abbreviation
Certain infectious and parasitic diseases	A00–B99	INF
Neoplasms	C00–D49	NEO
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	D50–D89	BLD
Endocrine, nutritional and metabolic diseases	E00–E89	END
Mental, behavioral and neurodevelopmental disorders	F01–F99	MBD
Diseases of the nervous system	G00–G99	NVS
Diseases of the eye and adnexa	H00–H59	EYE
Diseases of the ear and mastoid process	H60–H95	EAR
Diseases of the circulatory system	I00–I99	CIR
Diseases of the respiratory system	J00–J99	RSP
Diseases of the digestive system	K00–K95	DIG
Diseases of the skin and subcutaneous tissue	L00–L99	SKN
Diseases of the musculoskeletal system and connective tissue	M00–M99	MUS
Diseases of the genitourinary system	N00–N99	GEN
Pregnancy, childbirth and the puerperium	O00–O9A	PRG
Certain conditions originating in the perinatal period	P00–P96	PNL
Congenital malformations, deformations and chromosomal abnormalities	Q00–Q99	MAL
Symptoms, signs and abnormal clinical and laboratory findings, NEC	R00–R99	SYM
Injury, poisoning and certain other consequences of external causes	S00–T88	INJ
External causes of morbidity	V00–Y99	EXT
Factors influencing health status and contact with health services	Z00–Z99	FAC

Abbreviations: CCSR, Clinical Classifications Software Refined; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification.

Table B.3. Exceptions to Guideline 12 to Default to the matching Codebook Chapter

ICD-10-CM Code	ICD-10-CM Code Description	Default CCSR Category	Default CCSR Category Description	CCSR Category Matching Codebook Chapter	CCSR Category Description Matching Codebook Chapter	Other CCSR Category	Other CCSR Category 2 Description
E28310	Symptomatic premature menopause	GEN023	Menopausal disorders	END015	Other specified and unspecified endocrine disorders	GEN024	Female infertility
E28319	Asymptomatic premature menopause	GEN023	Menopausal disorders	END015	Other specified and unspecified endocrine disorders	GEN024	Female infertility
G980	Neurogenic arthritis, not elsewhere classified	MUS032	Neurogenic/ neuropathic arthropathy	NVS020	Other specified nervous system disorders	None	None
I76	Septic arterial embolism	INF002	Septicemia	CIR030	Aortic and peripheral arterial embolism or thrombosis	None	None
K317	Polyp of stomach and duodenum	NEO073	Benign neoplasms	DIG008	Other specified and unspecified disorders of stomach and duodenum	None	None
Q860	Fetal alcohol syndrome (dysmorphic)	PNL015	Fetal alcohol syndrome	MAL010	Other specified and unspecified congenital anomalies	None	None

Abbreviations: CCSR, Clinical Classifications Software Refined; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification.

APPENDIX C: CROSS-REFERENCING THE CDC INJURY AND EXTERNAL CAUSE MATRICES TO THE CCSR FOR ICD-10-CM DIAGNOSES

The Centers for Disease Control and Prevention (CDC) publishes frameworks designed to organize International Classification of Diseases (ICD) coded injury data into meaningful groupings. The matrices are developed specifically to facilitate national and international comparability in the presentation of injury statistics. Injuries are described in two ways:

- The Injury Mortality Diagnosis Matrix classifies ICD injury codes by the body region (e.g. head, torso), and the nature of injury (e.g. fracture, laceration)
- External Cause of Morbidity Matrix classifies ICD injury codes by mechanism (e.g., motor vehicle, fall, firearm, or poisoning) and intent (e.g., unintentional, homicide/assault, suicide/self–harm, or undetermined).

The injury categories in the Clinical Classifications Software Refined (CCSR) for ICD-10-CM diagnoses, v2020.2, have been aligned with the CDC Proposed Framework for ICD-10-CM Injury Diagnosis Codes[22] with a few exceptions (Table C.1). Initial and subsequent injuries are classified into CCSR categories by the nature of the injury. All codes indicating a sequela injury are classified into the CCSR category of INJ073 (Injury, sequela) regardless of the nature of injury.

Table C.1. CDC Nature of Injury by CCSR Category

CDC Nature of Injury	CCSR Category	CCSR Category Description
Amputation	INJ014	Amputation of a limb, initial encounter
	INJ015	Amputation of other body parts, initial encounter
	INJ051	Amputation of a limb, subsequent encounter
	INJ052	Amputation of other body parts, subsequent encounter
	INJ073	Injury, sequela
Blood vessel	INJ016	Injury to blood vessels, initial encounter
	INJ053	Injury to blood vessels, subsequent encounter
	INJ073	Injury, sequela
Burns	INJ019	Burn and corrosion, initial encounter
	INJ056	Burns and corrosion, subsequent encounter
	INJ073	Injury, sequela
Corrosions	INJ019	Burn and corrosion, initial encounter
	INJ056	Burns and corrosion, subsequent encounter
	INJ073	Injury, sequela

[22] Hedegaard H, Johnson RL, Warner M, et al. Proposed framework for presenting injury data using the International Classification of Diseases, Tenth Revision, Clinical Modification diagnosis codes. National health statistics reports; no 89. Hyattsville, MD: National Center for Health Statistics. 2016.

CDC Nature of Injury	CCSR Category	CCSR Category Description
Crushing	INJ018	Crushing injury, initial encounter
	INJ055	Crushing injury, subsequent encounter
	INJ073	Injury, sequela
Dislocation	INJ007	Dislocations, initial encounter
	INJ044	Dislocations, subsequent encounter
	INJ035	Complication of internal orthopedic device or implant (Four codes classified by the CDC under dislocation are included in the CCSR category for Complications of internal orthopedic device or implant because they involve dislocation of prosthesis)
	INJ073	Injury, sequela
Effect of foreign body entering orifice	INJ020	Effect of foreign body entering opening, initial encounter
	INJ057	Effect of foreign body entering opening, subsequent encounter
	INJ073	Injury, sequela
Fracture	INJ001	Fracture of head and neck, initial encounter
	INJ002	Fracture of the spine and back, initial encounter
	INJ003	Fracture of torso, initial encounter
	INJ004	Fracture of the upper limb, initial encounter
	INJ005	Fracture of the lower limb (except hip), initial encounter
	INJ006	Fracture of the neck of the femur (hip), initial encounter
	INJ038	Fracture of head and neck, subsequent encounter
	INJ039	Fracture of the spine and back, subsequent encounter
	INJ040	Fracture of torso, subsequent encounter
	INJ041	Fracture of the upper limb, subsequent encounter
	INJ042	Fracture of lower limb (except hip), subsequent encounter
	INJ043	Fracture of the neck of the femur (hip), subsequent encounter
	INJ035	Complication of internal orthopedic device or implant (Six codes classified by the CDC under fracture are included in the CCSR category for Complications of internal orthopedic device or implant because they involve dislocation of prosthesis)
	INJ073	Injury, sequela

CDC Nature of Injury	CCSR Category	CCSR Category Description
Internal organ injury	INJ008	Traumatic brain injury (TBI); concussion, initial encounter
	INJ009	Spinal cord injury (SCI), initial encounter
	INJ010	Internal organ injury, initial encounter
	INJ045	Traumatic brain injury (TBI); concussion, subsequent encounter
	INJ046	Spinal cord injury (SCI), subsequent encounter
	INJ047	Internal organ injury, subsequent encounter
	INJ073	Injury, sequela
Muscles and tendons	INJ025	Injury to nerves, muscles and tendons, initial encounter
	INJ062	Injury to nerves, muscles and tendons, subsequent encounter
	INJ073	Injury, sequela
Nerves	INJ025	Injury to nerves, muscles and tendons, initial encounter
	INJ062	Injury to nerves, muscles and tendons, subsequent encounter
	INJ073	Injury, sequela
Open wound	INJ011	Open wounds of head and neck, initial encounter
	INJ012	Open wounds to limbs, initial encounter
	INJ013	Open wounds of trunk, initial encounter
	INJ048	Open wounds of head and neck, subsequent encounter
	INJ049	Open wounds to limbs, subsequent encounter
	INJ050	Open wounds of trunk, subsequent encounter
	INJ073	Injury, sequela
Other effects of external causes	INJ021	Effect of other external causes, initial encounter
	INJ058	Effect of other external causes, subsequent encounter
	INJ074	Effect of other external causes, sequela
	INJ032	Maltreatment/abuse, initial encounter (The categorization of maltreatment/abuse (initial and subsequent) is created for the CCSR to facilitate public reporting)
	INJ068	Maltreatment/abuse, subsequent encounter (The categorization of maltreatment/abuse (initial and subsequent) is created for the CCSR to facilitate public reporting)

CDC Nature of Injury	CCSR Category	CCSR Category Description
Other injury	INJ026	Other specified injury, initial encounter
	INJ063	Other specified injury, subsequent encounter
	INJ035	Complication of internal orthopedic device or implant (Two codes classified by the CDC under other injury are included in the CCSR category for Complications of internal orthopedic device or implant because they involve dislocation of prosthesis)
	INJ005	Fracture of the lower limb (except hip), initial encounter (Physeal fractures to the legs classified by the CDC under other injury are included in the CCSR category for Fractures of the lower limb)
	INJ042	Fracture of lower limb (except hip), subsequent encounter (Physeal fractures to the legs classified by the CDC under other injury are included in the CCSR category for Fractures of the lower limb)
	INJ073	Injury, sequela
Poisoning	INJ022	Poisoning by drugs, initial encounter
	INJ059	Poisoning by drugs, subsequent encounter
	INJ075	Poisoning/toxic effect/adverse effects/underdosing,
Sprains and strains	INJ024	Sprains and strains, initial encounter
	INJ061	Sprains and strains, subsequent encounter
	INJ073	Injury, sequela
Superficial and contusion	INJ017	Superficial injury; contusion, initial encounter
	INJ054	Superficial injury; contusion, subsequent encounter
	INJ073	Injury, sequela
Toxic effects	INJ023	Toxic effects, initial encounter
	INJ060	Toxic effects, subsequent encounter
	INJ075	Poisoning/toxic effect/adverse effects/underdosing, sequela
Unspecified injury	INJ027	Other unspecified injury, initial encounters
	INJ064	Other unspecified injuries, subsequent encounter
	INJ073	Injury, sequela

Abbreviations: CDC, Centers for Disease Control and Prevention; CCSR, Clinical Classifications Software Refined.

The external cause categories in the CCSR for ICD-10-CM diagnoses, v2020.2, have been aligned with the External Cause-of-Injury Framework for Categorizing Mechanism and Intent of Injury (Updated December 2019).[23] Table C.2 lists the CCSR categories for intent and Table C.3 lists the CCSR categories for the mechanism of the injury. External cause of injury codes for the initial encounter are classified into separate CCSR categories. Regardless of the mechanism and intent, external cause codes for subsequent injuries are grouped into EXT029 (External cause codes: subsequent encounter) and external cause codes for sequela injuries are grouped into EXT030 (External cause codes: sequela).

Table C.2. CDC Injury Intent by CCSR Category

CDC Intent of Injury	CCSR Category	CCSR Category Description
Unintentional	EXT020	External cause codes: intent of injury, accidental/unintentional
Intentional self-harm	EXT021	External cause codes: intent of injury, self-harm
Assault	EXT022	External cause codes: intent of injury, assault
Undetermined	EXT023	External cause codes: intent of injury, undetermined
Legal intervention/ war operations	EXT024	External cause codes: intent of injury, legal intervention/war

Abbreviations: CDC, Centers for Disease Control and Prevention; CCSR, Clinical Classifications Software Refined.

Table C.3. CDC Injury Mechanism by CCSR Category

CDC Mechanism of Injury	CCSR Category	CCSR Category Description
Cut/pierce	EXT001	External cause codes: cut/pierce; initial encounter
Drowning/submersion	EXT002	External cause codes: drowning/submersion; initial encounter
Fall	EXT003	External cause codes: fall; initial encounter
Fire/burn, including fire/flame and hot object/substance	EXT004	External cause codes: fire/burn; initial encounter
Firearm	EXT005	External cause codes: firearm; initial encounter
Machinery	EXT006	External cause codes: machinery; initial encounter
Motor vehicle traffic, including occupant, motorcyclist, pedal cyclist, pedestrian, other, unspecified	EXT007	External cause codes: motor vehicle traffic (MVT); initial encounter

[23] Hedegaard H, Johnson RL, Garnett MF, Thomas KE. The International Classification of Diseases, 10th Revision, Clinical Modification (ICD–10–CM) external cause-of-injury framework for categorizing mechanism and intent of injury. National Health Statistics Reports; no 136. Hyattsville, MD: National Center for Health Statistics. 2019.

CDC Mechanism of Injury	CCSR Category	CCSR Category Description
Nontraffic motor vehicle, pedal cyclist	EXT008	External cause codes: pedal cyclist; not MVT; initial encounter
Nontraffic motor vehicle, pedestrian	EXT009	External cause codes: pedestrian; not MVT; initial encounter
Nontraffic motor vehicle, including other land transport, and other transport	EXT010	External cause codes: transport; not MVT; initial encounter
Natural/environment, excluding bites	EXT011	External cause codes: natural/environment; initial encounter
Natural/environment, including venomous and nonvenomous bites	EXT012	External cause codes: bites; initial encounter
Overexertion	EXT013	External cause codes: overexertion; initial encounter
Poisoning by drugs	EXT014	External cause codes: poisoning by drug
Poisoning by non-drug	EXT015	External cause codes: poisoning by non-drug
Struck by/against	EXT016	External cause codes: struck by; against; initial encounter
Suffocation	EXT017	External cause codes: suffocation/inhalation; initial encounter
Other specified, including child/adult abuse, foreign body, and not elsewhere classifiable	EXT018	External cause codes: other specified, classifiable and NEC; initial encounter
Unspecified	EXT019	External cause codes: unspecified mechanism

Abbreviations: CDC, Centers for Disease Control and Prevention; CCSR, Clinical Classifications Software Refined; MVT, motor vehicle traffic; NEC, not elsewhere classified.