

# Diagnosis Code Set General Equivalence Mappings

## ICD-10-CM to ICD-9-CM and ICD-9-CM to ICD-10-CM

### 2009 Version

### Documentation and User's Guide

## Preface

### Purpose and Audience

This document accompanies the initial 2009 release of the National Center for Health Statistics (NCHS) public domain diagnosis code reference mappings of the International Classification of Diseases 10<sup>th</sup> Revision Clinical Modification (ICD-10-CM) and the International Classification of Diseases 9<sup>th</sup> Revision (ICD-9-CM) Volumes 1 & 2. The purpose of this document is to give readers the information they need to understand the structure and relationships contained in the mappings so they can use the information correctly. The intended audience includes but is not limited to professionals working in health information, medical research and informatics. General interest readers may find section 1 useful. Those who may benefit from the material in both sections 1 and 2 include clinical and health information professionals who plan to directly use the mappings in their work. Software engineers and IT professionals interested in the details of the file format will find this information in Appendix A.

### Document Overview

For readability, ICD-9-CM is abbreviated “I-9,” and ICD-10-CM is abbreviated “I-10.” The network of relationships between the two code sets described herein is named the General Equivalence Mappings (GEMs).

- **Section 1** is a general interest discussion of mapping as it pertains to the GEMs. It includes a discussion of the difficulties inherent in translating between two coding systems. The specific conventions and terms employed in the GEMs are discussed in more detail.
- **Section 2** contains detailed information on how to use the GEM files for users who will be working directly with mapping applications now or in the future—as coding experts, researchers, claims processing personnel, software developers, etc.
- The **Glossary** provides a reference list of the terms and conventions used—some unique to this document—with their accompanying definitions.
- **Appendix A** contains tables describing the technical details of the file formats, one for each of the two GEM files:
  - 1) ICD-9-CM to ICD-10-CM (I-9 to I-10)
  - 2) ICD-10-CM to ICD-9-CM (I-10 to I-9)

## **Section 1—Mapping and the GEMs**

### **Translating Between the ICD-9 and ICD-10 Diagnosis Code Sets**

Mappings between I-9 and I-10 attempt to find corresponding diagnosis codes between the two code sets, insofar as this is possible. In some areas of the classification the correlation between codes is fairly close, and since the two code sets share the conventions of organization and formatting common to both revisions of the International Classification of Diseases, translating between them is straightforward. Many infectious disease, neoplasm, eye, and ear codes are examples of fairly straightforward correspondence between the two code sets. In other areas—obstetrics, for example—whole chapters are organized along a different axis of classification. In such cases, translating between them the majority of the time can offer only a series of possible compromises rather than the mirror image of one code in the other code set.

<b>I-10 Description</b>	<b>Correlation</b>	<b>I-9 Description</b>	<b>Unequal Axis of classification</b>
A02.21 Salmonella meningitis	=	003.21 Salmonella meningitis	None
C92.01 Acute myeloid leukemia, in remission	=	205.01 Myeloid leukemia, acute, in remission	None
O26.851 Spotting complicating pregnancy, first trimester	≠	649.50 Spotting complicating pregnancy, unspecified episode of care	Stage of pregnancy (I-10) vs. Episode of care (I-9)
O26.852 Spotting complicating pregnancy, second trimester		649.51 Spotting complicating pregnancy, delivered	
O26.853 Spotting complicating pregnancy, third trimester		649.53 Spotting complicating pregnancy, antepartum	
O26.859 Spotting complicating pregnancy, unspecified trimester			

A sentence translated from English to Chinese may not be able to capture the full meaning of the original because of fundamental differences in the structure of the language. Likewise, a code set may not be able to seamlessly link the codes in one set to identical counterparts in the other code set. For these two diagnosis code sets, it is often difficult to find two corresponding descriptions that are identical in level of specificity and terminology used. This is understandable. Indeed,

there would be little point in changing from the old system to the new system if the differences between the two, and the benefits available in the new system, were not significant.

There is no simple “crosswalk from I-9 to I-10” in the GEM files. A mapping that forces a simple correspondence—each I-9 code mapped only once—from the smaller, less detailed I-9 to the larger, more detailed I-10 defeats the purpose of upgrading to I-10. It obscures the differences between the two code sets and eliminates any possibility of benefiting from the improvement in data quality that I-10 offers. Instead of a simple crosswalk, the GEM files attempt to organize those differences in a meaningful way, by linking a code to all valid alternatives in the other code set from which choices can be made depending on the use to which the code is put.

It is important to understand the kinds of differences that need to be reconciled in linking coded data. The method used to reconcile those differences may vary, depending on whether the data is used for research, claims adjudication, or analyzing coding patterns between the two code sets; whether the desired outcome is to present an all-embracing look at the possibilities (one-to-many mapping) or to offer the one “best” compromise for the application (one-to-one mapping); whether the desired outcome is to translate existing coded data to their counterparts in the new code set (“forward mapping”) or to track newly coded data back to what they may have been in the previous code set (“backward mapping”), or any number of other factors. The scope of the differences varies, is complex, and cannot be overlooked if quality mapping and useful coded data are the desired outcomes. Several common types of differences between the code sets will be examined here in detail to give the reader a sense of the scope.

### Diagnosis Codes and Differences in Classification

ICD-10-CM has been updated to reflect the current clinical understanding and technological advancements of medicine, and the code descriptions are designed to provide a more consistent level of detail. It contains a more extensive vocabulary of clinical concepts, body part specificity, patient encounter information, and other components from which codes are built.

For example, an I-9 code description containing the words “complicated open wound” does not have a simple one-to-one correspondent in I-10. The I-9 description identifies the clinical concept “complicated,” but according to the note at the beginning of the section, that one concept includes any of the following: delayed healing, delayed treatment, foreign body or infection. I-10 does not classify open wound codes based on the general concept “complicated.” It categorizes open wounds by wound type—laceration or puncture wound, for example—and then further classifies each type of open wound according to whether a foreign body is present. I-10 open wound codes do not mention delayed healing or delayed treatment, and instructional notes advise the coder to code any associated infection separately. Therefore, depending on the documentation in the record, the correct correspondence between and I-9 and I-10 code could be one of several.

## Diagnosis Codes and Levels of Specificity

### **I-9 and I-10 Code Sets Compared:** *Code Length and Set Size*

	<b>ICD-9-CM</b>	<b>ICD-10-CM</b>
<b># of Characters</b>	<b>3-5 Numeric (+V and E codes)</b>	<b>3-7 Alphanumeric</b>
<b># of Codes</b>	<b>~13,500</b>	<b>~68,000</b>

As shown in the table above, I-10 codes may be longer, and there are about five times as many of them. Consequently, in an unabridged I-9 to I-10 mapping, each I-9 code is typically linked to more than one I-10 code, because each I-10 code is more specific.

I-10 is much more specific than I-9, and, just as important for purposes of mapping, the level of precision in an I-10 code is more consistent within clinically pertinent ranges of codes. In I-9, on the other hand, the level of detail among code categories varies greatly. For example, category 733, Other disorders of bone and cartilage, contains the codes:

- 733.93 Stress fracture of tibia or fibula
- 733.94 Stress fracture of the metatarsals
- 733.95 Stress fracture of other bone

The first two codes specify the site of the fracture but the third code is an “umbrella” code for all other bones in the body. In practical terms this means that the general I-9 code 733.95 must represent a whole host of disparate fracture sites. Diagnoses that are identified by umbrella codes lose their uniqueness as coded data. When only the coded I-9 data is available, it is impossible to tell which bone was fractured. On the other hand, in many instances I-10 provides specific codes for all likely sites of a stress fracture, including more specificity for the bones of the extremities, the pelvis and the vertebra. Stress fracture data coded in I-10 possesses a consistent level of specificity.

One might expect an I-10 to I-9 mapping never to contain one-to-many mappings, since I-10 is so much larger and more specific. However, there are cases where I-9 contains more detail than I-10, especially where a clinical concept or axis of classification is no longer deemed essential information. Aspects of some individual I-9 code descriptions, such as information about how a diagnosis was confirmed, were intentionally not included in I-10. This means a single I-10 code could be linked to more than one I-9 code option, depending on the purpose of the mapping and the specific documentation in the medical record.

Below are two examples where a distinction made in I-9 is not made in I-10. The result is that the I-10 code could be linked to more than one I-9 code, because a particular area of the I-9 code set (highlighted in the table) contains detail purposely left out of I-10.

**Specificity in I-9 and not in I-10:**

*Method of Detection*

I-9 contains	I-10 contains
010.90 Primary tuberculous infection, <b>unspecified examination</b> 010.91 Primary tuberculous infection, <b>bacteriological/histological exam not done</b> 010.92 Primary tuberculous infection, <b>bacteriological/histological exam unknown (at present)</b> 010.93 Primary tuberculous infection, <b>tubercle bacilli found by microscopy</b> 010.94 Primary tuberculous infection, <b>tubercle bacilli found by bacterial culture</b> 010.95 Primary tuberculous infection, <b>tubercle bacilli confirmed histologically</b> 010.96 Primary tuberculous infection, <b>tubercle bacilli confirmed by other methods</b>	A15.7 Primary respiratory tuberculosis

**Specificity in I-9 and not in I-10:**

*Legal Status and completeness of procedure*

I-9 contains	I-10 contains
635.50 <b>Legally induced abortion</b> , complicated by shock, <b>unspecified</b>	O04.81 Shock following (induced) termination of pregnancy
635.51 <b>Legally induced abortion</b> , complicated by shock, <b>incomplete</b>	
635.52 <b>Legally induced abortion</b> , complicated by shock, <b>complete</b>	
636.50 <b>Illegal abortion</b> , complicated by shock, <b>unspecified</b>	
636.51 <b>Illegal abortion</b> , complicated by shock, <b>incomplete</b>	
636.52 <b>Illegal abortion</b> , complicated by shock, <b>complete</b>	

Diagnosis Codes in Combination

One I-9 or I-10 code can contain more than one diagnosis. For purposes of mapping, these are called combination codes. A combination code can contain several types of diagnoses. For example, a combination code can consist of a chronic condition with a current acute manifestation, as in I-9 code *250.21 Diabetes with hyperosmolarity, type I (juvenile type), not stated as uncontrolled*. Or a combination code can consist of two acute conditions found together, as in I-10 code *R65.21 Severe sepsis with septic shock*. Or a combination code can consist of an acute condition and its external cause, as in I-10 code *T58.01 Toxic effect of carbon monoxide from motor vehicle exhaust, accidental (unintentional)*.

If a combination code in one code set has a corresponding combination code in the other code set, then the two entries are linked in the usual way. It is only when a combination code in one set is broken into discrete diagnosis codes in the other set that another method of mapping is needed.

Mapping in cases where a combination code in one set corresponds to two or more discrete diagnosis codes in the other set requires that the combination code be linked simultaneously to two or more codes in the other code set. Each discrete diagnosis code is a partial expression of

the information contained in the combination code and must be linked together as one GEM entry to fully describe the same conditions specified in the combination code. Entries of this type are linked using a special mapping attribute that indicates the allowable A+B+C choices.

**I-9 to I-10 mapping, combination entry:**

*Histoplasma duboisii meningitis*

ICD-9-CM Source→	≈	ICD-10-CM Target
115.11 Histoplasma duboisii meningitis	≈	B39.5 Histoplasmosis duboisii <b>AND</b> G02 Meningitis in other infectious and parasitic diseases classified elsewhere

**I-10 to I-9 mapping, combination entry:**

*Atherosclerosis of autologous vein coronary artery bypass graft(s) with unstable angina pectoris*

ICD-10-CM Source→	≈	ICD-9-CM Target
I25.710 Atherosclerosis of autologous vein coronary artery bypass graft(s) with unstable angina pectoris	≈	414.02 Coronary atherosclerosis of autologous biological bypass graft <b>AND</b> 411.1 Intermediate coronary syndrome

## Introduction to the GEMs

The I-10 and I-9 GEMs are used to facilitate linking between the diagnosis codes in I-9 volume 1 and the new I-10 code set. The GEMs are formatted as downloadable “flat” text files. Each file contains a list of code pairs. One code pair and its associated attributes occupy one line in the file. Each code pair identifies a correspondence between a code in the source system and a code in the target system. First is the code in the source system, followed by a single code in the target system. The code in the source system is repeated on more than one line if there are multiple code alternatives in the target system, or if it is a combination entry. After the code pair come the attributes that apply to that code pair. The attributes can be used to analyze and reconcile the differences between the two coding systems. The GEMs are the raw material from which providers, health information vendors and payors can design and create specific mapping applications. This is covered in more detail in section 2.

The I-9 to I-10 GEM contains entries of interest if the coded medical record or test record generated for systems analysis uses I-9. The user could, for example, use the GEM to see all possible options if the record had been coded in I-10, or to see if one I-9 test case will yield several alternative I-10 test cases.

The I-10 to I-9 GEM, on the other hand, contains entries of interest if the diagnosis coded, or the test case generated, uses I-10. In this case, the GEM facilitates mapping back to the I-9 alternatives that could represent how the I-10 diagnosis might have been coded in I-9—for example, to determine how a diagnosis would be reimbursed.

The word “crosswalk” is often used to refer to mappings between annual code updates of I-9. Crosswalk carries with it a comfortable image: clean white lines mark the boundary on either side; the way across the street is the same in either direction; a traffic signal, or perhaps even a crossing guard, aids you from one side to the other. Please be advised: *GEMs are not crosswalks*. They are reference mappings, to help the user navigate the complexity of translating meaning from one code set to the other. They are tools to help the user understand, analyze, and make distinctions that manage the complexity, and to derive their own applied mappings if that is the goal. The GEMs are more complex than a simple one-to-one crosswalk, but ultimately more useful. They reflect the relative complexity of the code sets clearly so that it can be managed effectively, rather than masking it in an oversimplified way.

An entry in the GEM identifies relationships between a code in the source system and possible equivalents in the target system. If a mapping is described as having a direction, the source is the code one is mapping from, and the target is the code being mapped to.

Source→		Target		a.k.a.
From	ICD-9-CM	To	ICD-10-CM	“forward mapping”
From	ICD-10-CM	To	ICD-9-CM	“backward mapping”

The correspondence between codes in the source and target systems is approximate in most cases. As with translating between languages, translating between coding systems does not necessarily yield an exact match. Context is everything, and the specific purpose of an applied mapping must be identified before the most appropriate option can be selected.

The GEMs together provide a general (many to many) reference mapping that can be refined to fit the requirements of an applied mapping. For a particular code entry, the GEM may contain several possible translations, each on a separate row. The code in the source system is listed on a new row as many times as there are alternatives in the target system. Each correspondence is formatted as a code pair. The user must choose from among the alternatives a single code in the target system if a one-to-one mapping is desired.

The word “entry,” as used to describe the format of the GEM, refers to all rows in the GEM file having the same first listed code, the code in the source system. The word “row” refers to a single line in the file, containing a code pair—one code from the source system and one code from the target system—along with its associated attributes. An entry typically encompasses multiple rows.

There are two basic types of entries in the GEM. They are “single entry” and “combination entry.” In special cases, a code in the source system may be mapped using both types of entries.

- *Single entry*—an entry in the GEM for which a code in the source system linked to one code option in the target system is a valid entry

An entry of the single type is characterized by a single correspondence: code A in the source system corresponds to code A **or** code B **or** code C in the target system. Each row in the entry can be one of several valid correspondences, and each is an option for a “one to one” applied mapping. An entry may consist of one row, if there is a close correspondence between the two codes in the code pair.

An entry of the single type is not the same as a one-to-one mapping. A code in the source system may be used multiple times in the GEM, each time linked to a different code in the target system. This is because the GEM contains alternative equivalent relationships from which the appropriate applied mapping can be selected. Taken together, all rows containing the same source system code linked to single code alternatives are considered one entry of the single type.

Here is an entry of the single type, consisting of four rows. The rows can be thought of as rows A **or** B **or** C **or** D. Each row of the entry is considered a valid applied mapping option.

**I-9 to I-10 GEM:**

*Single type entry for ICD-9-CM code 599.71*

ICD-9-CM Source→	≈	ICD-10-CM Target
599.7 Microscopic hematuria	≈	R31.1 Benign essential microscopic hematuria
599.7 Microscopic hematuria	≈	R31.2 Other microscopic hematuria

Because I-10 codes are for the most part more specific than I-9 codes, an entry of the single type in the I-9 to I-10 GEM is typically linked to multiple I-10 codes. The user must know, or must model, the level of detail contained in the original medical record to be able to settle on one of the I-10 codes. The I-9 code itself cannot contain the answer; it cannot be made to describe detail it does not have. The same is occasionally true for the I-10 to I-9 GEM as well. An I-10 code

may be linked to more than one I-9 code because detail in I-9 was purposely left out of I-10, as discussed earlier.

Both I-9 and I-10 contain what we refer to as “combination codes.” These are codes that contain more than one diagnosis in the code description. An example is I-10 code *R65.21 Severe sepsis with septic shock*. In this case, I-9 does not have an equivalent combination code, so in order to link the I-10 code to its I-9 equivalent, a combination entry must be used in the GEM.

- *Combination entry*—an entry in the GEM for which a code in the source system must be linked to more than one code option in the target system to be a valid entry

An entry of the combination type is characterized by a compound correspondence: code A in the source system must be linked simultaneously to code A **and** code B **and** code C in the target system to be a valid correspondence. Attributes in the GEM file clearly signal these special cases.

Stated another way, it takes more than one code in the target system to satisfy all of the meaning contained in one code in the source system. As discussed in this section, the situation occurs both when I-9 is the source system and when I-10 is the source system.

Here is an entry of the combination type, consisting of two rows in the format of the GEM file. The rows can be thought of as rows A **and** B. The rows of the entry combined are considered one complete translation.

**I-10 to I-9 GEM:**

*Combination type entry for ICD-10-CM code R65.21*

ICD-10-CM Source→	≈	ICD-9-CM Target
R65.21 Severe sepsis with septic shock	≈	995.92 Severe sepsis <b>AND</b> 785.52 Septic shock

Linking a code in the source system to a combination of codes in the target system is accomplished by using conventions in the GEMs called *scenarios* and *choice lists*.

- *Scenario*—in a combination entry, a collection of codes from the target system containing the necessary codes that combined as directed will satisfy the equivalent meaning of a code in the source system
- *Choice list*—in a combination entry, a list of one or more codes in the target system from which one code must be chosen to satisfy the equivalent meaning of a code in the source system

Here is the combination type entry for *R65.21, Severe sepsis with septic shock* as it is depicted in the “flat text” GEM format, and repeated below in table format with the code descriptions and attributes labeled.

R6521	99592	101	1	1
R6521	78552	101	1	2

There are two rows in the I-10 to I-9 GEM for combination code R65.21. The entry is of the combination type, meaning that each row—code R65.21 linked to both of the two I-9 codes—is considered a valid entry. The combination flag is highlighted in the tables. The scenario number is 1, because there is only one version of the diagnoses specified in the combination code. There are two choice lists in this entry, and only one code in each choice list.

I-10 Code	I-10 Description	I-9 Code	I-9 Description	Approximate [FLAG]	No Map [FLAG]	Combination [FLAG]	Scenario	Choice list
R65.21	Severe sepsis with septic shock	995.92	Severe sepsis	1	0	1	1	1
R65.21	Severe sepsis with septic shock	785.52	Septic shock	1	0	1	1	2

It is important to make the distinction between a single row in a combination entry and an entry of the single type. An entry of the single type is one code in the source system linked to multiple one-code alternatives in the target system. It presents the option of linking one code in the source system to code **A or B or C** in the target system. Each code correspondence is considered a viable option. Each row of the source system code entry linked with target code **A or B or C** is one valid entry in an applied map.

An entry of the combination type is one code in the source system linked to a multiple-code alternative in the target system. If the source system is I-10, for example, the user **must** include I-9 codes **A and B and C** in order to cover all the diagnoses identified in the I-10 code. Further, there may be more than one multiple-code alternative. If the GEM contains a range of I-9 code alternatives for each partial expression of the I-10 code, then the number of solutions increases. Each instance of the I-10 combination code paired with one code of the allowed range A and one code of the allowed range B and one code of the allowed range C is considered a valid entry. The combination flag in the GEM will clearly signal an entry of the combination type.

The two entry types and their main features are summarized in the table below.

Entry Type	Summary Description	Approximate [FLAG]	No Map [FLAG]	Combination [FLAG]	Scenario	Choice list
Single	Source system code has one or more single target code alternatives	On or Off	N/A	Off	0	0
Combination	Source system code has one or more multiple target code alternatives	On	N/A	On	1-9	1-9

## **Section 2—How to Use GEM Files**

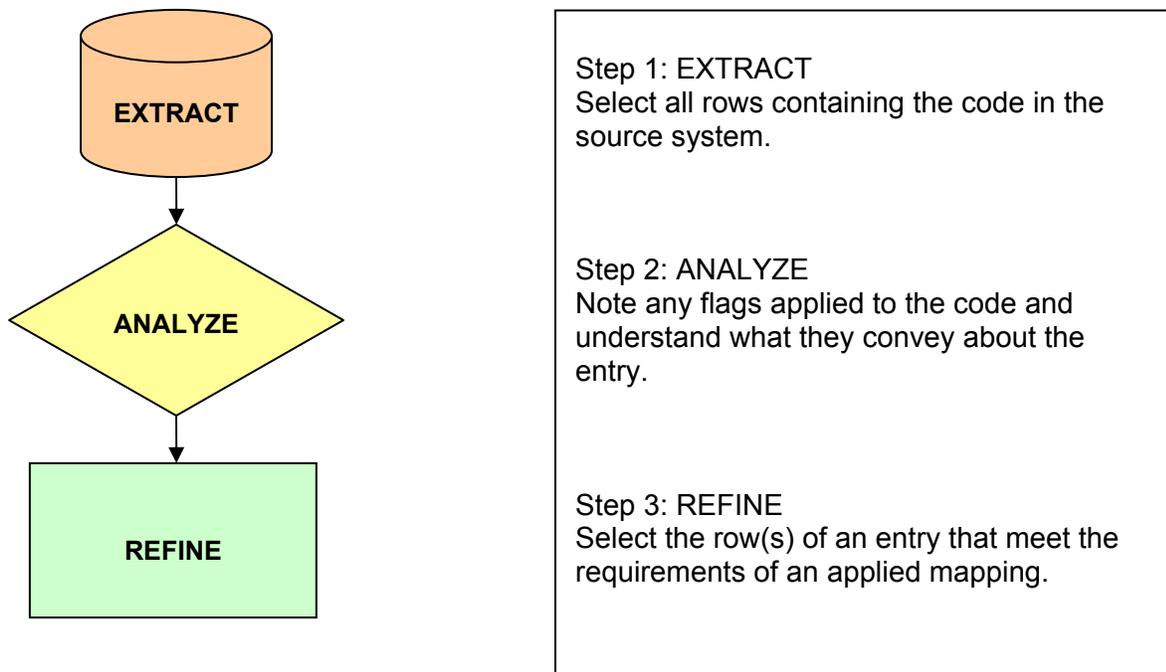
For ease of use, we recommend loading the GEM files into a database along with the code descriptions for both code sets. With roughly 80,000 codes and their descriptions in both code sets, a desktop database like MS Access is adequate.

ICD-10-CM code descriptions can be found on the NCHS website with this documentation.

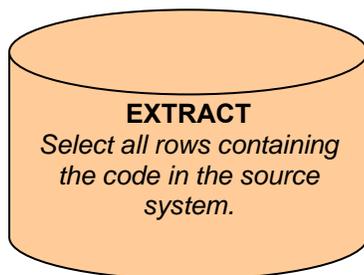
ICD-9-CM code descriptions can be found at:

<http://www.cdc.gov/nchs/icd9.htm#RTF>

A general process for using the GEMs consists of three basic steps:



### **Step 1: EXTRACT**



- *Have all rows that contain the same code from the source system been selected?*
- *Does the entry include multiple rows?*
- *Is the entry of the single type or combination type, or both?*

The code we will use for purposes of demonstration is I-9 code 599.7, *Hematuria*.

**I-9 to I-10 GEM:**  
599.7 *Hematuria*



```

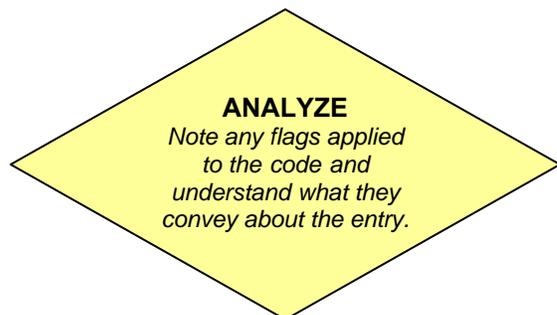
5990 N390 00000
5991 N360 00000
5992 N361 00000
5993 N362 00000
5994 N360 10000
5995 N368 10000
59960 N139 10000
59969 N139 10000
5997 R310 10000
5997 R311 10000
5997 R312 10000
5997 R319 10000
59981 N3641 00000
59982 N3642 00000
59983 N368 10000
59984 N368 00000
59989 N398 00000
5999 N369 10000
5999 N399 10000
    
```

The illustrations at left and below display the I-9 code 599.7 as it appears in the I-9 to I-10 GEM. At left is the entry in text file format, and below is the same information as it would appear in a desktop database. Note that the codes do not contain decimals in the GEMs.

The code in the source system is listed first, followed by the code in the target system. Here the source system is the I-9 code and the target system is the I-10 code. The final group of digits is used to indicate additional attributes for entries in the map. The first three digits are called flags. The last two digits are used in combination entries, and will be discussed later. This version of the GEM file contains a flag characterizing the degree of correspondence between codes in one row (“approximate” flag), a flag for codes with no correspondence in the target system (“no map” flag) and a flag indicating the row is part of a combination entry (“combination” flag). If the digit is 1, the flag applies (is “turned on”) to that entry in the GEM. If the digit is 0, the flag does not apply (is “turned off”) to that entry in the GEM. In other words, 1 means “yes,” the flag applies to the entry in the GEM and 0 means, “no,” the flag does not apply. There are four rows in the I-9 to I-10 GEM for code 599.7. The entry is of the single type, meaning that each row—code 599.7 linked to one of four I-10 code alternatives—is considered a valid entry.

I-9 Code	I-9 Description	I-10 Code	I-10 Description	Approximate [FLAG]	No Map [FLAG]	Combination [FLAG]
599.7	Hematuria	R31.0	Gross hematuria	1	0	0
599.7	Hematuria	R31.1	Benign essential microscopic hematuria	1	0	0
599.7	Hematuria	R31.2	Other microscopic hematuria	1	0	0
599.7	Hematuria	R31.9	Hematuria, unspecified	1	0	0

## Step 2: ANALYZE



- Is the “approximate” flag turned on?*
- If yes, the correspondence is not a precise equivalent.
- Is the “no map” flag turned on?*
- If yes, there is no corresponding code in the target system.
- Is the “combination” flag turned on?*
- If yes, more than one code in the target system is required to satisfy the meaning of the code in the source system.

In the GEMs, there are three flags:

**Approximate**    *indicates that the entry is not considered equivalent*

**No Map**        *indicates that a code in the source system is not linked to any code in the target system*

**Combination**    *indicates that more than one code in the target system is required to satisfy the full equivalent meaning of a code in the source system*

### The Approximate Flag

I-9 Code	I-9 Description	I-10 Code	I-10 Description	Approximate [FLAG]	No Map [FLAG]	Combination [FLAG]
599.7	Hematuria	R31.0	Gross hematuria	1	0	0
599.7	Hematuria	R31.1	Benign essential microscopic hematuria	1	0	0
599.7	Hematuria	R31.2	Other microscopic hematuria	1	0	0
599.7	Hematuria	R31.9	Hematuria, unspecified	1	0	0

The approximate flag is turned on when no one code in the target system or linked combination of codes in the target system expresses the same essential meaning as the code in the source system. The difference between the two systems is typically in level of detail between the codes, and in nearly all cases the I-10 code is more detailed than the I-9 code.

The approximate flag is on for all rows in the GEM for I-9 code 599.7. The level of detail differs here—the type of hematuria is specified in I-10 and not in I-9. Although *599.7 Hematuria* in I-9

and *R31.9 Hematuria, unspecified* in I-10 could be said to be equal, in fact they are not, because the I-9 code represents all varieties of hematuria and the I-10 code represents only hematuria not specified in the record. The approximate flag is turned on to indicate no single code in I-10 expresses the same meaning as 599.7.

The approximate flag is on for the majority of entries in the GEMs. This may include code pairs that have the same description in both code sets. In such cases, neighboring codes in a subcategory are more specific in one code set than another, and so the number of clinical conditions included in a code is different—hence it does not express the same essential meaning. Codes containing the word “other” in their description are a common example.

I-10 Code	I-10 Description	I-9 Code	I-9 Description	Approximate [FLAG]	No Map [FLAG]	Combination [FLAG]
B37.41	Candidal cystitis and urethritis	112.2	Candidiasis of other urogenital sites	1	0	0
B37.42	Candidal balanitis	112.2	Candidiasis of other urogenital sites	1	0	0
B37.49	Other urogenital candidiasis	112.2	Candidiasis of other urogenital sites	1	0	0

In this example, the body sites included in the “other candidiasis” code differs between code sets, so the approximate flag is on for all entries in this subcategory. I-10 has specific codes for cystitis/urethritis and balanitis. I-9 does not. In I-9, balanitis is listed as an “includes” note under the code *112.2 Candidiasis of other urogenital sites*, and cystitis or urethritis have no specific entry in tabular.

### The No Map Flag

I-9 Code	I-9 Description	I-10 Code	I-10 Description	Approximate [FLAG]	No Map [FLAG]	Combination [FLAG]
V64.41	Laparoscopic surgical procedure converted to open procedure	NoDx	No Description	0	1	0
V64.42	Thoracoscopic surgical procedure converted to open procedure	NoDx	No Description	0	1	0
V64.43	Arthroscopic surgical procedure converted to open procedure	NoDx	No Description	0	1	0

In the I-9 to I-10 GEM, the “no map” flag is on for a subset of I-9 codes. In this example, the I-9 codes do not identify a diagnosis, but instead further specify the reason why a procedure was

performed differently than planned. The decision was made that I-10 will not contain information regarding procedures, so I-10 does not contain an equivalent group of codes, and therefore the I-9 codes cannot be linked to I-10 at all. In the I-9 to I-10 GEM they are listed without a corresponding I-10 entry, and with the “no map” flag on.

## The Combination Flag

The combination flag is turned on when a code in the source system must be linked to more than one code in the target system to be a valid entry. When the combination flag is on, the *scenario* and *choice list* fields in the GEM contain a number. They appear last in the GEM text file, after the flags. These numbers allow the user to collate the combination entries in the GEM.



T422x1	9662	10111
T422x1	E8558	10112
T422x1	9660	10121
T422x1	E8558	10122
T422x2	9662	10111
T422x2	E9504	10112
T422x2	9660	10121
T422x2	E9504	10122
T422x3	9662	10111
T422x3	E9620	10112
T422x3	9660	10121
T422x3	E9620	10122
T422x4	9662	10111
T422x4	E9804	10112
T422x4	9660	10121

### I-10 to I-9 GEM:

*T42.2x1 Poisoning by succinimides and oxazolidinediones, accidental (unintentional)*

The illustrations at left and below display the entry for I-10 diagnosis code *T42.2x1 Poisoning by succinimides and oxazolidinediones, accidental (unintentional)*, as it appears in the I-10 to I-9 GEM. At left is the entry in text file format, and below is the same information as it would appear in a desktop database. The I-10 combination code T42.2x1 specifies both the diagnosis and the external cause, so it requires a combination entry in the GEM. A combination entry is subdivided hierarchically on two levels: 1) By *scenario*, the number of variations of diagnosis combinations

included in the source system code, and 2) By *choice list*, the possible target system codes that combined are one valid expression of a scenario.

Each of the two types of drug listed in the I-10 code T42.2x1 is a unique I-9 code, so there are two scenarios from which to choose an applied mapping: one that specifies poisoning by succinimides and one that specifies poisoning by oxazolidinediones. Because each drug type listed in the I-10 combination code requires its own diagnosis code in I-9, each version of the diagnosis is assigned a separate *scenario* number in the GEM.

A scenario designates one version of the meaning of the source system diagnosis as specified in a combination code. In other words, it identifies one roughly equivalent expression of the source system code. In this example, scenario 1 contains the I-9 codes needed to satisfy the equivalent meaning of “Poisoning by succinimides, accidental (unintentional)” Scenario 2 contains all the I-9 codes needed to specify “Poisoning by oxazolidinediones, accidental (unintentional).”

A scenario is subdivided into two or more choice lists of codes in the target system. These are the codes that must be linked together in an applied mapping to satisfy the equivalent meaning of the combination code in the source system. A choice list contains one or more codes in the target system that express a portion of the meaning of the code in the source system. A code must be included from each choice list in a scenario to satisfy the equivalent meaning of the code in the source system.

I-10 Code	I-10 Description	I-9 Code	I-9 Description	Approximate [FLAG]	Combination [FLAG]	Scenario	Choice list
<b>Scenario 1</b>							
T422x1	Poisoning by succinimides and oxazolidinediones, accidental (unintentional)	966.2	Poisoning by succinimides	1	1	1	1
T422x1	Poisoning by succinimides and oxazolidinediones, accidental (unintentional)	E855.8	Other specified drugs acting on central and autonomic nervous systems	1	1	1	2
<b>Scenario 2</b>							
T422x1	Poisoning by succinimides and oxazolidinediones, accidental (unintentional)	966.0	Poisoning by oxazolidine derivatives	1	1	2	1
T422x1	Poisoning by succinimides and oxazolidinediones, accidental (unintentional)	E855.8	Other specified drugs acting on central and autonomic nervous systems	1	1	2	2

In this example there are two I-9 choice lists in scenario 1 and two I-9 choice lists in scenario 2, with one I-9 code in each list.

This is a comparatively simple example of a combination entry because each choice list contains only one code. The user does not need to choose among alternatives beyond the scenario.

The result is that for this I-10 combination entry, there are only two applied mapping alternatives:

### Scenario 1

ICD-10-CM Source→	≈	ICD-9-CM Target
T42.2x1 Poisoning by succinimides and oxazolidinediones, accidental (unintentional)	≈	966.2 Poisoning by succinimides <b>AND</b> E855.8 Other specified drugs acting on central and autonomic nervous systems

**OR**

**Scenario 2**

ICD-10-CM Source→	≈	ICD-9-CM Target
T42.2x1 Poisoning by succinimides and oxazolidinediones, accidental (unintentional)	≈	966.0 Poisoning by oxazolidine derivatives <b>AND</b> E855.8 Other specified drugs acting on central and autonomic nervous systems

Step 3: REFINE

**REFINE**  
 Select the row(s) of an entry that meet the requirements of an applied mapping.

- *What is the purpose of the applied mapping?*
- *Does the applied mapping require that the code in the source system be mapped to only one “best” alternative in the target system?*
- *Will the correct applied mapping vary depending on the documentation in the record?*

Once the user has analyzed all rows for an entry in the GEM, it is possible to select the row or rows most appropriate to a specific mapping application. We will use two different sample entries—one combination entry from the I-9 to I-10 GEM and one single entry from the I-10 to I-9 GEM—in order to discuss the process of refining an entry and deriving an applied mapping.

**Sample Entry 1—I-9 to I-10 GEM**

*896.2 Traumatic amputation of foot (complete) (partial), bilateral, without mention of complication*

I-9 Code	I-9 Description	I-10 Code	I-10 Description	Approximate [FLAG]	No Map [FLAG]	Combination [FLAG]	Scenario	Choice list
896.2	Traumatic amputation of foot (complete) (partial), bilateral, without mention of complication	S98011	Complete traumatic amputation of right foot at ankle level	1	0	1	1	1
896.2	Traumatic amputation of foot (complete) (partial), bilateral, without mention of complication	S98021	Partial traumatic amputation of right foot at ankle level	1	0	1	1	1
896.2	Traumatic amputation of foot (complete) (partial), bilateral, without mention of complication	S98012	Complete traumatic amputation of left foot at ankle level	1	0	1	1	2
896.2	Traumatic amputation of foot (complete) (partial), bilateral, without mention of complication	S98022	Partial traumatic amputation of left foot at ankle level	1	0	1	1	2

In this instance the I-9 code specifies that the traumatic amputation is bilateral but does not specify whether it is partial or complete. Since both types of information—left or right foot, and whether the amputation is partial or complete—are specified in separate codes in I-10, the entry in the GEM is a combination entry. There are two choice lists in this entry, because two codes in I-10 are required to satisfy the equivalent meaning in the I-9 combination code. And because the injury can be partial on one side and complete on the other, both sides partial, or both sides complete, there are two choices in each choice list.

After collating the combination entries into their respective choice lists (there is only one scenario), the four available possibilities are:

ICD-9-CM Source→	≈	ICD-10-CM Target
896.2 Traumatic amputation of foot (complete) (partial), bilateral, without mention of complication	≈	S98011 Complete traumatic amputation of right foot at ankle level
	≈	<b>AND</b> S98012 Complete traumatic amputation of left foot at ankle level
	<b>OR</b>	
	≈	S98011 Complete traumatic amputation of right foot at ankle level
	≈	<b>AND</b> S98022 Partial traumatic amputation of left foot at ankle level
	<b>OR</b>	
	≈	S98021 Partial traumatic amputation of right foot at ankle level
	≈	<b>AND</b> S98012 Complete traumatic amputation of left foot at ankle level
	<b>OR</b>	
	≈	S98021 Partial traumatic amputation of right foot at ankle level
	<b>AND</b>	
	≈	S98022 Partial traumatic amputation of left foot at ankle level

To refine this entry, first the user must decide whether or not it is possible to record the correct combination of left and right, partial and complete, and if possible, whether or not it is necessary. This decision of course depends on the mapping application.

A health information professional or health statistics researcher who is converting old I-9 records to I-10, and has access to the individual medical record, can make use of the increased specificity in I-10 codes. The user can simply refer to the original record to see the specific nature of the bilateral traumatic amputation and assign the correct pair of I-10 codes to the record.

However, a health statistics analyst or data modeler who is translating aggregate I-9 data forward to I-10, and has no access to individual medical records, cannot make use of the fine distinctions in I-10, since they are not present in the old data. In this case, finding the

closest equivalent cannot be the goal. The user must choose an I-10 code or pair of codes to represent all the I-10 possibilities, and could choose to fashion a rule by which to map similar cases. Rules specific to the applied mapping would promote consistency and document the decisions made. For example, here the applied mapping could use only the partial traumatic amputation codes. This same method could be used to translate a record coded in I-10 back to I-9, and could then be processed by a legacy payment system for reimbursement.

**Sample Entry 2—I-10 to I-9 GEM:**

*I21.11 ST elevation (STEMI) myocardial infarction involving right coronary artery  
Inferoposterior transmural (Q wave) infarction (acute)*

I-10 Code	I-10 Description	I-9 Code	I-9 Description	Approximate [FLAG]	No Map [FLAG]	Combination [FLAG]
I21.11	ST elevation (STEMI) myocardial infarction involving right coronary artery	410.30	Acute myocardial infarction of inferoposterior wall, episode of care unspecified	1	0	0
I21.11	ST elevation (STEMI) myocardial infarction involving right coronary artery	410.31	Acute myocardial infarction of inferoposterior wall, initial episode of care	1	0	0
I21.11	ST elevation (STEMI) myocardial infarction involving right coronary artery	410.32	Acute myocardial infarction of inferoposterior wall, subsequent episode of care	1	0	0

The approximate flag is on, indicating that the relationship between the code in the source system and the code in the target system is an approximate equivalent. The approximate flag is on for every myocardial infarction entry for the two GEM files because the classification of myocardial infarctions is fundamentally different. The difference lies in the classification of the episode of care. I-9 classifies the diagnosis according to whether this is the patient's first or subsequent visit for treatment of a particular myocardial infarction. This information is not specified in I-10. I-10 uses the term "subsequent" to refer to a new myocardial infarction within 4 weeks of a previous infarction, regardless of the site.

There is only one way to refine this entry for a clinically accurate I-10 to I-9 applied mapping: to choose among the alternatives in I-9, the user must have access to the detail in the original record.

If the patient record is not available, or the mapping application is intended to establish general rules for translation rather than deciding on a case-by-case basis, then a consistent method must be derived and documented for resolving the disparity in classification between the two systems. Depending on the mapping application, the user may want to

equate all I-10 myocardial infarction codes with I-9 codes indicating initial episode of care and not include the other I-9 codes as alternatives in the I-10 to I-9 applied mapping.

Mapping from I-9 to I-10, however would require that all I-9 codes be used. In this case, specific information from the patient record would be necessary to determine whether the myocardial infarction was “initial” or “subsequent” in I-10 terms. If this level of detail is unnecessary, the default rule could be to ignore the I-10 codes indicating a subsequent infarction for purposes of an applied I-9 to I-10 mapping.

These kinds of decisions must take into account the specific applied mapping needed. For example, mapping research data gathered during a period that overlaps the use of both I-10 and I-9, a tailored applied mapping would be needed. But for patient records coded in I-10 and mapped internally to I-9 for billing systems integrity checking during the transition period, a rule could be applied that maps all I-10 codes only to the I-9 codes indicating initial episode of care.

## **Glossary**

*Approximate flag*—attribute in a GEM that when turned on indicates that the entry is not considered equivalent

*Applied mapping*—distillation of a reference mapping to conform to the needs of a particular application (e.g., data quality, research)

*Backward mapping*—mapping that proceeds from a newer code set to an older code set

*Choice list*—in a combination entry, a list of one or more codes in the target system from which one code must be chosen to satisfy the equivalent meaning of a code in the source system

*Combination flag*—attribute in a GEM that when turned on indicates that more than one code in the target system is required to satisfy the full equivalent meaning of a code in the source system

*Combination entry*—an entry in the GEM for which a code in the source system must be linked to more than one code option in the target system to be a valid entry

*Forward mapping*—mapping that proceeds from an older code set to a newer code set

*General Equivalence Map (GEM)*—reference mapping that attempts to include all valid relationships between the codes in the ICD-9-CM diagnosis classification and the ICD-10-CM diagnosis classification

*ICD-9-CM*—International Classification of Diseases 9<sup>th</sup> Revision Clinical Modification (I-9)

*ICD-10-CM*—International Classification of Diseases 10<sup>th</sup> Revision Clinical Modification (I-10)

*No map flag*—attribute in a GEM that when turned on indicates that a code in the source system is not linked to any code in the target system

*Reference mapping*—mapping that includes all possible valid relationships between a source system and a target system

*Scenario*—in a combination entry, a collection of codes from the target system containing the necessary codes that when combined as directed will satisfy the equivalent meaning of a code in the source system

*Single entry*—an entry in the GEM for which a code in the source system linked to one code option in the target system is a valid entry

*Source system*—code set of origin in the mapping; the set being mapped ‘from’

*Target system*—destination code set in the mapping; the set being mapped ‘to’

## Diagnosis Code Set General Equivalence Mappings 2009 Version Documentation

### Appendix A—File and Format Detail

#### ICD-9-CM to ICD-10-CM General Equivalence Map (GEM)

**FILE NAME:** 2009\_I9gem.txt

#### FILE FORMAT

FIELD	POSITION	LENGTH	VALUE
ICD-9-CM Code [source]	1 – 5	5	Left justified, blank filled No decimal
<i>Filler</i>	6	1	<i>Blank</i>
ICD-10-CM Code [target]	7 – 13	7	All seven characters used, no decimal
<i>Filler</i>	14	1	<i>Blank</i>
Approximate [FLAG]	15	1	1 = Yes/On 0 = No/Off
No Map [FLAG]	16	1	1 = Yes/On 0 = No/Off
Combination [FLAG]	17	1	1 = Yes/On 0 = No/Off
Scenario	18	1	0 – 9
Choice list	19	1	0 – 9

**ICD-10-CM to ICD-9-CM  
General Equivalence Map (GEM)**

**FILE NAME:** 2009\_I10gem.txt

**FILE FORMAT**

FIELD	POSITION	LENGTH	VALUE
ICD-10-CM Code [source]	1 – 7	7	Left justified, blank filled No decimal
<i>Filler</i>	8	1	<i>Blank</i>
ICD-9-CM Code [target]	9 – 13	5	All seven characters used, no decimal
<i>Filler</i>	14	1	<i>Blank</i>
Approximate [FLAG]	15	1	1 = Yes/On 0 = No/Off
No Map [FLAG]	16	1	1 = Yes/On 0 = No/Off
Combination [FLAG]	17	1	1 = Yes/On 0 = No/Off
Scenario	18	1	0 – 9
Choice list	19	1	0 – 9

**ICD-10-CM Codes and Descriptions**

**FILE NAME:** 2009\_I10desc.txt

**FILE FORMAT**

FIELD	POSITION	LENGTH	VALUE
ICD-10-CM Code	1 – 7	7	Left justified, blank filled No decimal
<i>Filler</i>	8	1	<i>Blank</i>
ICD-10-CM Description	9 – 250	240	Mixed case