Procedure Code Set General Equivalence Mappings
ICD-10-PCS to ICD-9-CM and ICD-9-CM to ICD-10-PCS
Documentation and User's Guide

Preface

Purpose and Audience

This document accompanies the 2017 update of the Centers for Medicare and Medicaid Studies (CMS) public domain code reference mappings of the ICD-10 Procedure Code System (ICD-10-PCS) and the International Classification of Diseases 9th Revision (ICD-9-CM) Volume 3. 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-PCS is abbreviated "PCS." 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 of different design and structure. 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 applied mappings—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-PCS (I-9 to PCS)
    2) ICD-10-PCS to ICD-9-CM (PCS to I-9)

Section 1—Mapping and the GEMs

Translating Between the ICD-9 and ICD-10 Procedure Code Sets
Mappings between I-9 and I-10 attempt to find corresponding procedure codes between the two code sets, insofar as this is possible. Because the two systems are so different, 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.

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 mapping may not be able to seamlessly link the codes in one set to identical counterparts in the other code set, and this is especially true with I-9 and PCS. For these two procedure code sets, it is rare 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 PCS" 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 PCS (a code set of entirely different design and scope) defeats the purpose of upgrading to PCS. It obscures the differences between the two code sets and eliminates any possibility of benefiting from the improvement in data quality that PCS 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.

Procedure Codes and Differences in Structure

PCS is designed to avoid regional variants of code descriptions and "running out" of code capacity. It contains a standardized vocabulary of surgical concepts, body part terms, operative approaches, and so on, from which codes are built. For these reasons, translating between the two systems is often an "apples to oranges" enterprise.

The majority of the time, finding the "one correct" match in PCS coding concepts for a general I-9 concept is not possible. Because it is standardized, PCS contains code elements describing the precise objective of each coded procedure. Each of these concepts, called a "root operation" or "root type," is defined in the system and can be used only when the procedure performed agrees with the root operation or root type definition. Further, because a word like "repair" as used in I-9 does not identify a precise surgical objective, the possible code alternatives in PCS must include all of the root operations that could have been performed. This means that any initial mapping between the systems must cast a wide net over possible equivalent options, options that can only be narrowed down using rules, historical I-9 frequency data, or some other method for bridging the difference in meaning.

For example, an I-9 code description containing the words "repair of aneurysm" does not have a simple one-to-one correspondent in PCS. The I-9 description identifies the diagnosis of aneurysm, (information which is captured on the record in the diagnosis code) but does not specify the method of repair. Depending on the documentation in the record, the correct PCS code could be one of several root operations: excision, replacement, or restriction, to name a few. All we know is that whatever is done to "repair" an aneurysm is included in the I-9 code description.

Procedure Codes and Levels of Specificity

I-9 and I-10 Code Sets Compared:
Code Length and Set Size
ICD-9-CM   3-4 Numeric characters   ~4,000 codes
ICD-10-PCS 7 Alphanumeric characters   ~72,000 codes

As shown above, PCS codes are longer, and there are many times more of them. Consequently, in an unabridged I-9 to PCS mapping, each I-9 code is typically linked to more than one PCS code, because each PCS code is more specific.

PCS is much more precise than I-9, and, just as important for purposes of mapping, the level of precision in a PCS code is standardized across the system. Within I-9, on the other hand, the level of detail varies greatly between codes. For example, category 39, Other operations on vessels, contains two codes with very different levels of detail:

> 39.31 Suture of artery
> 39.55 Reimplantation of aberrant renal vessel

The first code contains a precise description of the surgical technique (suture) but is very general with respect to location (an artery somewhere). The second code does not specify the method of reimplantation, but on other subjects is much more specific, containing a precise description of both the body part (renal vessel) and the diagnosis for which the procedure was performed (aberrant attachment to kidney, i.e., congenital anomaly).

I-9 descriptions or "includes" notes may contain several variations of a procedure. In practical terms this means that one general I-9 code actually represents a whole family of codes. Procedures that are identified by such "umbrella" codes lose their uniqueness as coded data. For

example, an I-9 procedure code may include both the words "excision" and "destruction" of a body part in its description. This means that either an excision or a destruction procedure could have been performed. When only the coded I-9 data is available it is impossible to tell which method was used.

In PCS, by contrast, each significant variation is a unique procedure code and is defined consistently throughout the system. Excision and destruction are distinct root operations in PCS, identified as unique procedure codes.

One would not expect a PCS code to be linked to more than one I-9 code, since PCS is so much larger and more specific. However, since I-9 can be inconsistent, there are inevitable cases where it contains more detail than PCS. Characteristics of some I-9 procedure codes, such as subdividing body parts or approaches for a single procedure code category, or including diagnosis information in the description, were intentionally not incorporated in the PCS design. The ramification for mapping is that a PCS code may be linked to more than one I-9 code option, and choosing a closest match depends on the purpose of the mapping and whether the specific documentation in the chart is available.

Below are examples where a distinction made in I-9 is not made in PCS. The result is that the PCS code may be linked to more than one I-9 code, because a particular area of the I-9 code set is more detailed than the norm.

Varying Specificity in I-9: *Body Part Subdivided*
Example 1
PCS contains
0LQ70ZZ Repair Right Hand Tendon, Open Approach
0LQ80ZZ Repair Left Hand Tendon, Open Approach

       I-9 contains
       83.64 Other suture of tendon

       I-9 also contains
       83.61 Suture of tendon sheath

Example 2
PCS contains
0HBT0ZZ Excision of Right Breast, Open Approach
0HBU0ZZ Excision of Left Breast, Open Approach

       I-9 contains
       85.23 Subtotal mastectomy

       I-9 also contains
       85.22 Resection of quadrant of breast

Varying Specificity in I-9: *Approaches Unique to Pituitary Gland*
PCS contains
0GT00ZZ Resection of Pituitary Gland, Open Approach

       I-9 contains
       07.69 Total excision of pituitary gland, unspecified approach

<blockquote>
I-9 also contains
07.64 Total excision of pituitary gland, transfrontal approach
07.65 Total excision of pituitary gland, transsphenoidal approach
07.68 Total excision of pituitary gland, other specified approach
</blockquote>

Procedure Codes and Approach

Approach is another area that complicates translating between I-9 and PCS. In PCS, approach is defined as "the technique used to reach the site of the procedure." Further, all approaches used in PCS are defined, and these definitions aid in choosing the correct code. Two examples are "open" and "percutaneous."

- *Open*—cutting through the skin or mucous membrane and any other body layers necessary to expose the site of the procedure

- *Percutaneous*—Entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and/or any other body layers necessary to reach the site of the procedure

By contrast, what constitutes "approach" is not defined in I-9, nor are the specific approaches used in I-9 codes defined (e.g., open, closed). Consequently the notion of approach itself is handled inconsistently in the system, and specific approaches can be difficult to interpret for correct coding.

For example, correct coding of an exploratory laparotomy followed by needle biopsy of the liver requires two separate codes in I-9:

> 54.11 Exploratory laparotomy
> 50.11 Closed (percutaneous) [needle] biopsy of liver

Though both codes appear to identify an operative approach, here they are not being used for the same purpose. The laparotomy code specifies the technique used to expose the site of the procedure. But the closed biopsy code specifies the instrument employed to obtain the biopsy, not the technique used to expose the procedure site. In other clinical situations, this same closed biopsy code specifies something different—a needle biopsy obtained through the skin without making an incision. Hence one I-9 code for "closed" biopsy of the liver can mean two very different things, depending on what other procedures were performed during the same operative episode.

In this example, correct coding in I-9 relies on a shifting notion of approach. By contrast, in PCS there is no ambiguity. If a biopsy of the liver is obtained by cutting through the skin and intervening tissue to expose the liver and then using a needle to take the sample, the approach selected for the PCS code is *open*. If a biopsy of the liver is obtained using a needle through the skin and intervening layers, the approach selected for the PCS code is *percutaneous*.

The comparative lack of precision between the two systems has ramifications for mapping. How one would map the procedure code for closed biopsy from I-9 to PCS depends on the specific operative episode. There is no simple "right" answer.

Procedure Codes in Combination: I-9 to PCS

Sometimes two procedures commonly performed together are identified in a single umbrella code, as in code *65.41, Laparoscopic unilateral salpingo-oophorectomy.* I-9 also lists variations of combined procedures under a bigger umbrella code. This can be a general description, as in code *39.49, Other revision of vascular procedure,* where varying combinations of multiple procedures could have been performed. Alternatively the procedure code may essentially say, "Here is the diagnosis, and this procedure code includes any of a number of things done to attempt to treat this condition." It identifies the diagnosis clearly, but does not shed much light on the procedure. Examples include code *35.81, Total repair of tetralogy of fallot,* and code *03.53, Repair of vertebral fracture.*

Mapping in the above cases, where according to the PCS definition of a procedure multiple procedures may be performed, requires that the I-9 code be linked to multiple PCS codes or ranges of codes. Because a PCS code identifies a single standardized classification of a single procedure, multiple PCS codes are recorded to fully describe the procedures performed in an I-9 combination code. Each PCS code is a partial expression of the information contained in the I-9 code. Entries of this type are linked using a special mapping attribute that indicates the allowable A+B+C choices.

The PCS translation of the I-9 code for bilateral salpingo-oophorectomy is displayed in the example below. Note that because the I-9 code includes procedures on two distinct body parts, two codes are required in PCS.

I-9 to PCS mapping:
"Laparoscopic salpingo-oophorectomy, bilateral"

65.63 Laparoscopic removal of both ovaries and tubes at same operative episode
To   0UT24ZZ Resection of bilateral ovaries, percutaneous endoscopic approach
        AND
        0UT74ZZ Resection of bilateral fallopian tubes, percutaneous endoscopic approach

Procedure Codes in Combination: PCS to I-9

A PCS code specifies a single procedure as defined within the PCS. However, sometimes a PCS code must be linked to multiple I-9 codes because the I-9 primary procedure code is incomplete and so requires additional codes to convey specific information about the procedure. In I-9 these additional codes are referred to as "adjunct" procedure codes. They have been used increasingly in I-9, and function much like code extensions or modifiers in other systems: they convey additional information about the procedure performed, such as the number of devices placed or procedure sites treated. The detail contained in an I-9 primary procedure code plus an I-9 adjunct code can be found in a single PCS code. The result is that one PCS code must sometimes be linked to a combination of I-9 codes—the principal procedure code plus adjunct code(s).

PCS to I-9 mapping:
"Percutaneous Transluminal Coronary Angioplasty (PTCA) of two coronary arteries, with insertion of two coronary stents"

02713DZ Dilation of coronary artery, two sites using intraluminal device, percutaneous approach
To   00.66 Percutaneous transluminal coronary angioplasty [PTCA]
          AND
          00.41 Procedure on two vessels
          AND
          00.46 Insertion of two vascular stents
          AND
          36.06 Insertion of non-drug-eluting coronary artery stent(s)

Introduction to the GEMs

The PCS and I-9 GEMs are used to facilitate linking between the procedure codes in I-9 volume 3 and the new PCS code set. The GEMs are the raw material from which providers, health information vendors and payers can derive specific applied mappings to meet their needs. This is covered in more detail in section 2.

The I-9 to PCS GEM contains an entry for every I-9 code. Not all PCS codes are contained in the I-9 to PCS GEM; the I-9 to PCS GEM contains only those PCS codes which are plausible translations of the I-9 codes. As with a bi-directional translation dictionary, the translations given are based on the code looked up, called the source system code.

The I-9 to PCS GEM can be used to migrate I-9 historical data to a PCS based representation for comparable longitudinal analysis between I-9 coded data and PCS coded data. It can be used to create PCS based test records from a repository of I-9 based test records. The I-9 to PCS GEM can also be used for general reference.

The PCS to I-9 GEM contains an entry for every PCS code. Not all I-9 codes are contained in the PCS to I-9 GEM; the PCS to I-9 GEM contains only those I-9 codes which are plausible translations of the PCS codes. The translations given are based on the PCS code looked up, the source system code in the PCS to I-9 GEM.

The PCS to I-9 GEM can be used to convert I-9 based systems or applications to PCS based applications, or create one-to-one backwards mappings (also known as a crosswalk) from incoming I-10 based records to I-9 based legacy systems. This is accomplished by using the PCS to I-9 GEM, but looking up the *target system* code (I-9) to see all the *source system* possibilities (PCS). This is called reverse lookup. For more information on converting I-9 based systems and applications to I-10, see the MS-DRG conversion project report at:
http://www.cms.gov/ICD10/17_ICD10_MS_DRG_Conversion_Project.asp

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.

One entry in a GEM identifies relationships between one code in the source system and its 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.

- *From* ICD-9-CM *to* ICD-10-PCS is also known as "forward mapping"
- *From* ICD-10-PCs *to* ICD-9-CM is also known as "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, a 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 translation 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 GEMs are formatted as downloadable text files. Each file contains a list of code pairs. Each code pair identifies a translation 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 word "entry," as used to describe the format of a GEM, refers to all rows in a 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 single 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 a 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 a 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 translation: code A in the source system translates to code A **or** code B **or** code C in the target system. Each row in the entry can be one

of several valid translations, 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 a GEM, each time linked to a different code in the target system. This is because a 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 three rows. The rows can be thought of as rows A **or** B **or** C. Each row of the entry is considered a valid applied mapping option.

I-9 to PCS GEM:
Single type entry for I-9 code 02.11

02.11 Simple suture of dura mater of brain
To   00Q20ZZ Repair of dura mater, open approach
         00Q23ZZ Repair of dura mater, percutaneous approach
         00Q24ZZ Repair of dura mater, percutaneous endoscopic approach

Because PCS codes are for the most part more specific than I-9 codes, an entry of the single type in the I-9 to PCS GEM is typically linked to multiple PCS codes. The user must know, or must model, the level of detail contained in the original medical record to be able to choose one of the PCS 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 PCS to I-9 GEM as well. A PCS code may be linked to more than one I-9 code because of the variation in I-9 specificity and I-9's use of adjunct codes, described in detail later.

Both I-9 and PCS contain what we refer to as "combination codes." These are codes that contain more than one procedure in the code description. An example is PCS code *02733ZZ Dilation of Coronary Artery, Four or More Sites, Percutaneous Approach.* In this case, I-9 does not have an equivalent combination code, so in order to link the PCS code to its I-9 equivalent, a combination entry must be used in a GEM.

- *Combination entry*—an entry in a 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 translation: code A in the source system must be linked as a unit to code A **and** code B **and** code C in the target system to be a valid translation. Attributes in a 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 PCS is the source system.

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

PCS to I-9 GEM:
Combination type entry for PCS code 02733ZZ

02733ZZ Dilation of Coronary Artery, Four or More Sites, Percutaneous Approach
To   00.66 Percutaneous transluminal coronary angioplasty [PTCA]
         AND
         00.43 Procedure on four or more vessels

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

Below is the combination type entry for PCS code *02733ZZ Dilation of Coronary Artery, Four or More Sites, Percutaneous Approach* as it is depicted in the GEM text file format, and repeated with the code descriptions added and attributes labeled.

Source   Target Flags
02733ZZ 0066 10111
02733ZZ 0043 10112

02733ZZ Dilation of Coronary Artery, Four or More Sites, Percutaneous Approach

		Approximate	No Map	Combination	Scenario	Choice List
To	00.66	1	0	1	1	1
	Percutaneous transluminal coronary angioplasty [PTCA]					
AND	00.43	1	0	1	1	2
	Procedure on four or more vessels					

There are two rows in the PCS to I-9 GEM for combination code 02733ZZ. The entry is of the combination type, meaning that each row—code 02733ZZ linked to both of the two I-9 codes—is considered a valid entry. The combination flag is the third attribute in a GEM file. The scenario number is 1, because there is only one variation of the procedure specified in the combination code. There are two choice lists in this entry, and only one code in each choice list.

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 translation 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 PCS, for example, the user **must** include I-9 codes A **and** B **and** C in order to cover all aspects of the procedure identified in the PCS code. Further, there may be more than one multiple-code alternative. If a GEM contains a range of I-9 code alternatives for each partial expression of the PCS code, then the number of solutions increases. Each instance of the PCS 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 sometimes referred to as a "cluster," and is considered a valid translation. The combination flag in a GEM will clearly signal an entry of the combination type.

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

Single entry
- Source system code has one or more single target code alternatives
- Approximate flag is on or off
- No Map flag is on or off
- Combination flag is off
- Scenario is 0
- Choice list is 0

Combination entry
- Source system code has one or more multiple target code (aka cluster) alternatives
- Approximate flag is on
- No Map flag is off
- Combination flag is on
- Scenario is 1-9
- Choice list is 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-PCS long format code descriptions can be found at:
http://www.cms.gov/ICD10/

ICD-9-CM code descriptions can be found at:
http://www.cms.gov/ICD9ProviderDiagnosticCodes/

A general process for using the GEMs consists of three basic steps. In most cases it is expected these steps will be performed by software designed to integrate the GEMs content and translate codes or lists of codes from I-9 to PCS or vice versa. In that case that a small number of records need to be translated, and the user has access to the original medical record, it is more efficient and accurate to look the codes up directly in the respective ICD-9-CM or ICD-10-PCS book.

Step 1 *EXTRACT*
- Select all rows containing the code in the source system.

Step 2 *ANALYZE*
- Note any flags applied to the code and understand what they convey about the entry.

Step 3 *REFINE*
- Select the row(s) of an entry that meet the requirements of the applied mapping.

Step 1 *EXTRACT*

Select all rows containing the code in the source system.
- 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 *02.11, Simple suture of dura mater of brain.*

I-9 to PCS GEM:
02.11 Simple suture of dura mater of brain

Source   Target Flags
0211 00Q20ZZ 10000
0211 00Q23ZZ 10000
0211 00Q24ZZ 10000

02.11 Simple suture of dura mater of brain

		Approximate	No Map	Combination	Scenario	Choice List
To	00Q20ZZ	1	0	0	0	0
	Repair of dura mater, open approach					
	00Q23ZZ	1	0	0	0	0
	Repair of dura mater, percutaneous approach					

00Q24ZZ   1   0   0   0   0
Repair of dura mater, percutaneous endoscopic approach

The example above displays the I-9 procedure code 02.11 as it is depicted in the GEM text file format and is repeated with the code descriptions added and attributes labeled. 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 PCS 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. The GEM entry contains a flag characterizing the degree of correspondence between codes in one row ("approximate" flag), a flag for codes with no translation 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 a GEM. If the digit is 0, the flag does not apply (is "turned off") to that entry in a GEM. In other words, 1 means "yes," the flag applies to the entry in a GEM and 0 means, "no," the flag does not apply. There are three rows in the I-9 to PCS GEM for code 02.11. The entry is of the single type, meaning that each row—code 02.11 linked to one of three PCS code alternatives—is considered a valid entry.

Step 2 *ANALYZE*
Note any flags applied to the code and understand what they convey about the entry.
- Is the "approximate" flag turned on?
    - If yes, the translation 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 is 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

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. Because the I-9 and PCS structure and organization are so different, this flag is turned on for the great majority of entries in the GEMs. The difference between the two systems is

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typically in level of detail between the codes, and in nearly all cases the PCS code is more detailed than the I-9 code. The approximate flag is turned on for all rows in the source system GEM entry for I-9 code 02.11. The level of detail differs here—the approach is specified in PCS and not in I-9.

02.11 Simple suture of dura mater of brain

To   00Q20ZZ   Approximate = 1
        Repair of dura mater, open approach
        00Q23ZZ   Approximate = 1
        Repair of dura mater, percutaneous approach
        00Q24ZZ   Approximate = 1
        Repair of dura mater, percutaneous endoscopic approach

The No Map Flag

In the I-9 to PCS GEM, the "no map" flag is on for a subset of I-9 codes. I-9 contains adjunct codes that do not identify a procedure, but instead further specify an aspect of a procedure, such as the number of stents used in an angioplasty. They must be paired with an I-9 "primary procedure" code to be meaningful. Since they cannot be coded alone in I-9, they cannot be linked as a source system code to an equivalent code in PCS, because every PCS code is complete in itself as a procedure code. To put it another way, there are no PCS adjunct codes; every PCS code is a primary procedure code. In the I-9 to PCS GEM, I-9 adjunct codes are listed without a corresponding PCS entry, and with the "no map" flag on.

00.40 Procedure on single vessel
To   NoPCS   No Map = 1

00.41 Procedure on two vessels
To   NoPCS   No Map = 1

00.42 Procedure on three vessels
To   NoPCS   No Map = 1

00.43 Procedure on four or more vessels
To   NoPCS   No Map = 1

00.44 Procedure on vessel bifurcation
To   NoPCS   No Map = 1

Adjunct I-9 codes are listed below. In the I-9 to PCS GEM where I-9 codes are the source system, the "no map" flag is on for adjunct I-9 codes and they are not linked to any PCS code. In the PCS to I-9 GEM where I-9 codes are the target system, adjunct I-9 codes are included as linked alternatives where appropriate in an I-9 combination entry.

00.40   Procedure on single vessel
00.41   Procedure on two vessels
00.42   Procedure on three vessels
00.43   Procedure on four or more vessels
00.44   Procedure on vessel bifurcation

00.45	Insertion of one vascular stent
00.46	Insertion of two vascular stents
00.47	Insertion of three vascular stents
00.48	Insertion of four or more vascular stents
00.55	Insertion of drug-eluting stent(s) of other peripheral vessel(s)
00.60	Insertion of drug-eluting stent(s) of superficial femoral artery
00.63	Percutaneous insertion of carotid artery stent(s)
00.64	Percutaneous insertion of other precerebral (extracranial) artery stent(s)
00.65	Percutaneous insertion of intracranial vascular stent(s)
00.74	Hip replacement bearing surface, metal on polyethylene
00.75	Hip replacement bearing surface, metal-on-metal
00.76	Hip replacement bearing surface, ceramic-on-ceramic
00.77	Hip replacement bearing surface, ceramic-on- polyethylene
00.91	Transplant from live related donor
00.92	Transplant from live non-related donor
00.93	Transplant from cadaver
36.06	Insertion of non-drug-eluting coronary artery stent(s)
36.07	Insertion of drug-eluting coronary artery stent(s)
39.90	Insertion of non-drug eluting peripheral (non-coronary) vessel stent(s)
70.94	Insertion of biological graft
70.95	Insertion of synthetic graft or prosthesis
81.62	Fusion or refusion of 2-3 vertebrae
81.63	Fusion or refusion of 4-8 vertebrae
81.64	Fusion or refusion of 9 or more vertebrae
84.51	Insertion of interbody spinal fusion device
84.71	Application of external fixator device, monoplanar system
84.72	Application of external fixator device, ring system
84.73	Application of hybrid external fixator device

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 a GEM file contain a number. They appear last in a GEM file, after the flags. These numbers allow the user to collate the combination entries in a GEM.

I-9 to PCS GEM:
30.4 Radical laryngectomy
Complete [total] laryngectomy with radical neck dissection (with thyroidectomy) (with synchronous tracheostomy)

Source	Target	Flags
304	0CTS0ZZ	10111
304	0CTS4ZZ	10111
304	0CTS7ZZ	10111
304	0CTS8ZZ	10111
304	0WB60ZZ	10112
304	0WB63ZZ	10112
304	0WB64ZZ	10112
304	0WB6XZZ	10112
304	0CTS0ZZ	10121
304	0CTS4ZZ	10121
304	0CTS7ZZ	10121
304	0CTS8ZZ	10121
304	0WB60ZZ	10122
304	0WB63ZZ	10122

```
304  0WB64ZZ 10122
304  0WB6XZZ 10122
304  0GTG0ZZ 10123
304  0GTG4ZZ 10123
304  0GTH0ZZ 10123
304  0GTH4ZZ 10123
304  0GTK0ZZ 10123
304  0GTK4ZZ 10123
```

The example above displays the I-9 to PCS GEM entry for I-9 procedure code *30.4, Radical laryngectomy* as it is depicted in the GEM text file format. Below, the entry is repeated with the code descriptions added and attributes labeled. The I-9 procedure code 30.4 describes more than one procedure in PCS, so it requires a combination entry in the GEM. A combination is subdivided hierarchically on two levels: 1) By *scenario*, the number of variations of procedure 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 procedure listed in the "includes" notes of the I-9 code is a unique PCS code, so more than one PCS code is required to satisfy the equivalent meaning. Therefore, each PCS code for a different procedure is assigned a *choice list* number in the GEM entry.

In this example there are two PCS choice lists in scenario 1 and three PCS choice lists in scenario 2.

Scenario 1
30.4 Radical Laryngectomy
Complete [total] laryngectomy with radical neck dissection
30.4 Radical laryngectomy

		Approximate	No Map	Combination	Scenario	Choice List
To	0CTS0ZZ	1	0	1	1	1
	Resection of Larynx, Open Approach					
	0CTS4ZZ	1	0	1	1	1
	Resection of Larynx, Percutaneous Endoscopic Approach					
	0CTS7ZZ	1	0	1	1	1
	Resection of Larynx, Via Natural or Artificial Opening					
	0CTS8ZZ	1	0	1	1	1
	Resection of Larynx, Via Natural or Artificial Opening Endoscopic					
	07T10ZZ	1	0	1	1	2
	Resection of Right Neck Lymphatic, Open Approach					
	07T14ZZ	1	0	1	1	2
	Resection of Right Neck Lymphatic, Percutaneous Endoscopic Approach					
	07T20ZZ	1	0	1	1	2
	Resection of Left Neck Lymphatic, Open Approach					
	07T24ZZ	1	0	1	1	2
	Resection of Left Neck Lymphatic, Percutaneous Endoscopic Approach					

Scenario 2
30.4 Radical Laryngectomy
Complete [total] laryngectomy with radical neck dissection with thyroidectomy

30.4 Radical laryngectomy

		Approximate	No Map	Combination	Scenario	Choice List
To	0CTS0ZZ	1	0	1	2	1
	Resection of Larynx, Open Approach					
	0CTS4ZZ	1	0	1	2	1
	Resection of Larynx, Percutaneous Endoscopic Approach					
	0CTS7ZZ	1	0	1	2	1
	Resection of Larynx, Via Natural or Artificial Opening					
	0CTS8ZZ	1	0	1	2	1
	Resection of Larynx, Via Natural or Artificial Opening Endoscopic					
	07T10ZZ	1	0	1	2	2
	Resection of Right Neck Lymphatic, Open Approach					
	07T14ZZ	1	0	1	2	2
	Resection of Right Neck Lymphatic, Percutaneous Endoscopic Approach					
	07T20ZZ	1	0	1	2	2
	Resection of Left Neck Lymphatic, Open Approach					
	07T24ZZ	1	0	1	2	2
	Resection of Left Neck Lymphatic, Percutaneous Endoscopic Approach					
	0GTG0ZZ	1	0	1	2	3
	Resection of Left Thyroid Gland Lobe, Open Approach					
	0GTG4ZZ	1	0	1	2	3
	Resection of Left Thyroid Gland Lobe, Percutaneous Endoscopic Approach					
	0GTH0ZZ	1	0	1	2	3
	Resection of Right Thyroid Gland Lobe, Open Approach					
	0GTH4ZZ	1	0	1	2	3
	Resection of Right Thyroid Gland Lobe, Percutaneous Endoscopic Approach					
	0GTK0ZZ	1	0	1	2	3
	Resection of Thyroid Gland, Open Approach					
	0GTH4ZZ	1	0	1	2	3
	Resection of Thyroid Gland, Percutaneous Endoscopic Approach					

Step 3 *REFINE*

Select the row(s) of an entry that meet the requirements of the 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 a GEM, it is possible to select the row or rows most appropriate to an applied mapping. We will use two different sample entries of the combination type—one from the I-9 to PCS GEM and one from the PCS 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 PCS GEM
00.53 Implantation or replacement of CRT pacemaker generator

00.53 Implantation **or** replacement of CRT pacemaker generator

		Approximate	No Map	Combination	Scenario	Choice List
To	0JH607Z	1	0	0	0	0
	Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Chest Subcutaneous Tissue and Fascia, Open Approach					
	0JH637Z	1	0	0	0	0

Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Chest Subcutaneous
Tissue and Fascia, Percutaneous Approach

		Approximate	No Map	Combination	Scenario	Choice List
	0JH807Z	1	0	0	0	0

Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Abdomen Subcutaneous
Tissue and Fascia, Open Approach

	0JH837Z	1	0	0	0	0

Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Abdomen Subcutaneous
Tissue and Fascia, Percutaneous Approach

00.53 Implantation **or** replacement of CRT pacemaker generator

		Approximate	No Map	Combination	Scenario	Choice List
To	0JPT0PZ	1	0	1	1	1

Removal of Cardiac Rhythm Related Device from Trunk Subcutaneous Tissue and Fascia, Open
Approach

	0JPT3PZ	1	0	1	1	1

Removal of Cardiac Rhythm Related Device from Trunk Subcutaneous Tissue and Fascia,
Percutaneous Approach

	0JH607Z	1	0	1	1	2

Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Chest Subcutaneous
Tissue and Fascia, Open Approach

	0JH637Z	1	0	1	1	2

Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Chest Subcutaneous
Tissue and Fascia, Percutaneous Approach

	0JH807Z	1	0	1	1	2

Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Abdomen Subcutaneous
Tissue and Fascia, Open Approach

	0JH837Z	1	0	1	1	2

Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Abdomen Subcutaneous
Tissue and Fascia, Percutaneous Approach

In this instance an I-9 entry in a GEM is of both the single and the combination type. Because the I-9 code includes either implantation of the CRT pacemaker generator alone or removal of the old generator and insertion of a new one in the same operative episode, a GEM must translate both possibilities into their PCS equivalents. One variation requires one PCS code ("implantation" in the I-9 code) to satisfy the equivalent meaning, and the other variation requires two PCS codes ("replacement" in the I-9 code).

After classifying the entry into its single and combination entry constituents and collating the combination entries into their respective choice lists (there is only one combination scenario here), the alternatives are:

Single entry

00.53 Implantation **or** replacement of CRT pacemaker generator
To

0JH607Z Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Chest
Subcutaneous Tissue and Fascia, Open Approach
OR
0JH637Z Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Chest
Subcutaneous Tissue and Fascia, Percutaneous Approach
OR

0JH807Z Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Abdomen Subcutaneous Tissue and Fascia, Open Approach
OR
0JH837Z Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Abdomen Subcutaneous Tissue and Fascia, Percutaneous Approach

OR
Combination entry

00.53 Implantation **or** replacement of CRT pacemaker generator
To
0JPT0PZ Removal of Cardiac Rhythm Related Device from Trunk Subcutaneous Tissue and Fascia, Open Approach
OR
0JPT3PZ Removal of Cardiac Rhythm Related Device from Trunk Subcutaneous Tissue and Fascia, Percutaneous Approach

AND

0JH607Z Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Chest Subcutaneous Tissue and Fascia, Open Approach
OR
0JH637Z Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Chest Subcutaneous Tissue and Fascia, Percutaneous Approach
OR
0JH807Z Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Abdomen Subcutaneous Tissue and Fascia, Open Approach
OR
0JH837Z Insertion of Cardiac Resynchronization Pacemaker Pulse Generator into Abdomen Subcutaneous Tissue and Fascia, Percutaneous Approach

Note that either member of choice list 1 can be combined with either member of choice list 2. Although PCS codes having the same approach value (5th character identifies operative approach for all Medical and Surgical and related codes) are more likely to be used together, a GEM entry must accommodate all possible variations of an operative episode and allow for combinations with differing approach values. In this case a variation could be that the old generator was removed percutaneously and the new one inserted using an open approach.

To refine this entry, first the user must decide whether or not the applied mapping is going to encompass both the single and combination translation. This decision of course depends on the use for the mapping. A health information professional who is converting a limited number of old I-9 records to PCS, and has access to the individual medical record, can make use of the increased specificity in PCS codes and re-code the record directly in PCS. The user can simply refer to the original record to see the specific nature of the procedure and assign the correct PCS code(s) to the record.

However, a health statistics analyst or data modeler who is translating aggregate I-9 data forward to PCS, and has no access to individual medical records, cannot make use of the fine distinctions in PCS, since they are not present in the old data. In this case, finding the closest equivalent cannot be the goal. The user must choose a PCS code or pair of codes to represent the alternatives, 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 PCS Insertion codes.

Sample Entry 2—PCS to I-9 GEM:
0JB60ZZ Excision of Chest Subcutaneous Tissue and Fascia, Open Approach

0JB60ZZ Excision of Chest Subcutaneous Tissue and Fascia, Open Approach

		Approximate	No Map	Combination	Scenario	Choice List
To	83.39	1	0	0	0	0
	Excision of lesion of other soft tissue					
	83.44	1	0	0	0	0
	Other fasciectomy					
	86.22	1	0	0	0	0
	Excisional debridement of wound, infection, or burn					

The approximate flag is on, indicating that the relationship between the code in the source system and each of the codes in the target system is classified as an approximate equivalent only. In this case the I-9 codes are variously classified by general diagnostic condition, by body part, and by a choice of three diagnostic conditions, respectively. The I-9 code 83.39 classifies the procedure by the fact that a *lesion* of the soft tissue is excised—information that will be more precisely described in the diagnosis code. The I-9 code 83.44 is more precise in that it specifies the body layer—fascia—excised, but does not specify the site of the procedure. The I-9 code 86.22 specifies three possible diagnoses that could have occasioned the procedure—wound, infection, or burn—but like I-9 code 83.39 it does not specify the body layer or the procedure site. The ramification for mapping is that there is no one clear correct choice; the PCS code plausibly translates to all three I-9 codes. (Thirty-nine other PCS codes specifying other body parts and approaches translate to these same three I-9 codes.)

If a one-to-one mapping from the PCS code to a single I-9 choice is needed, then a consistent method must be derived and documented for resolving the disparity in classification between the two systems. Depending on the applied mapping, the user may want to base the decision on the closest matching code description, the most frequently coded of the I-9 choices based on I-9 historical data, or some other user-defined reference that will render the correct choice for the application. In this example, the closest matching description is *83.44 Other Fasciectomy*. However, this is highly unlikely to be the most frequently recorded of the three I-9 choices in a given data set. Based on FY 2007 MedPAR data, 83.44 was recorded 750 times, while 83.39 was recorded 16,324 times and 86.22 was recorded 104,156 times.

An analyst working with a team to convert a reimbursement system from an I-9 based system to an equivalent I-10 based "copy" will not need to account for the more specific body part detail in PCS. If all three I-9 codes are reimbursed at the same rate, then the PCS code effectively replaces all three of them in the I-10 based "copy" of the system, and choosing and documenting a single I-9 code to use in an applied mapping is not necessary.

However, a reimbursement specialist developing a backwards 10 to 9 map to interpose between incoming I-10 coded data and an I-9 based legacy system will need to choose a single I-9 code to map to among the three choices. For most reimbursement systems, as with the system conversion example above, reimbursement rates among similar I-9 codes are likely to be the same.

Therefore, if all three I-9 codes are reimbursed at the same rate, then it does not matter which I-9 code "stands in" for all three of them in the applied mapping. Any will do.

An analyst upgrading a legacy payment system to optimize for I-10 levels of specificity will likely use the increased approach or body part specificity in the PCS system to make finer distinctions in reimbursement rates. In this example, excision of fascia using the open approach could be reimbursed at a different rate than excision of fascia using the percutaneous approach, or excision of fascia of the face could be reimbursed at a different rate than excision of fascia of the foot. For upgrading a system to optimize for I-10 detail, the GEMs can be used as a reference, to see the PCS possibilities for a given I-9 code, and assign them accordingly in a new system tailored to PCS specificity after I-10 implementation, where records will be coded in PCS and reimbursed using PCS codes.

Glossary

Approach—a character of the seven-character ICD-10-PCS code that "defines the technique used to reach the site of the procedure"

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

Applied mapping—distillation of all or part of a GEM to conform to the needs of a particular application (i.e., data quality, reimbursement, 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 the corresponding code in the source system

Cluster—in a combination entry, one instance where a code is chosen from each of the choice lists in the target system entry, that when combined satisfies the equivalent meaning of the corresponding 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 a 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

Complete meaning [of a code]— all correctly coded conditions or procedures that would be classified to a code based on the code title, all associated tabular instructional notes, and all index references that refer to a code

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

General Equivalence Mapping (GEM)—reference mapping that attempts to include all valid relationships between the codes in the ICD-9-CM procedure classification and the ICD-10 Procedure Code System (ICD-10-PCS)

ICD-9-CM—International Classification of Diseases 9th Revision Clinical Modification (I-9)

ICD-10-PCS—ICD-10 Procedure Code System (PCS)

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

Reverse lookup—using a GEM by looking up a target system code to see all the codes in the source system that translate to it

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

Root operation—a character of the seven-character ICD-10-PCS code that "defines the objective of the procedure"

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 a 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'

Procedure Code Set General Equivalence Mappings
2017 Version Documentation

Appendix A—File and Format Detail

ICD-9-CM to ICD-10-PCS
General Equivalence Mapping (GEM)
FILE AND FORMAT

FILE NAME: gem_i9pcs.txt

FILE FORMAT

Field	Position	Length	Value
ICD-9-CM Code [source]	1-5	5	Left justified, blank filled, no decimal
Filler	6	1	Blank
ICD-10-PCS Code [target]	7-13	7	All seven characters used
Filler	14	1	Blank
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-PCS to ICD-9-CM
General Equivalence Mapping (GEM)
FILE AND FORMAT

FILE NAME: gem_pcsi9.txt

FILE FORMAT

Field	Position	Length	Value
ICD-10-PCS Code [source]	1-7	7	All seven characters used
Filler	8	1	Blank
ICD-9-CM Code [target]	9-13	5	Left justified, blank filled, no decimal
Filler	14	1	Blank
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