# Estimating the Impact of the Transition to ICD-10 on Medicare Inpatient Hospital Payments

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**Abstract**: On October 1, 2014 the reporting of diagnoses and procedures in the U.S. is due to transition from the clinical modification of the ninth revision of the International Classification of Diseases (ICD-9-CM) to the tenth revision (ICD-10). The impact of conversion to ICD-10 on Medicare MS-DRG payments to hospitals was estimated using 2010 Medicare data. A minimal hospital payment decrease of 0.04 percent was found using the ICD-10 version 30 of MS-DRGs. The estimate is shown to be critically dependent on the methods used to re-code ICD-9 data into ICD-10. Impact also varies by MS-DRG and is therefore sensitive to case mix. **Key words:** *ICD-10, Payment Impact, MS-DRGs*

Since 1979 the U.S. has used the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) to report diagnosis data across all sites of service and procedure data for inpatient care. On October 1, 2014, ICD-9-CM is due to be replaced by the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) to report diagnosis data across all sites of service and the International Classification of Diseases, Tenth Revision, Procedure Coding System (ICD-10-PCS) to report inpatient procedure data. ICD-10-CM/PCS substantially increases the level of clinical detail that can be captured and reported. In the FY 2013 update of ICD-9-CM there were 14,613 diagnosis codes and 3,838 procedure codes. In the FY 2013 update of ICD-10-CM there were 69,832 diagnosis codes and in ICD-10-PCS there were 71,920 procedure codes. For brevity ICD-10-CM/PCS will be referred to as ICD-10.

Since diagnosis and procedure based patient classification systems such as the Diagnosis Related Groups (DRGs) are used in payment methodologies, payers must adapt their payment systems to ICD-10. In many areas, ICD-10 classifies clinical conditions and procedures differently than ICD-9-CM does. As a result the conversion of complex payment methodologies from ICD-9-CM to ICD-10 or the use of maps from ICD-10 to ICD-9-CM could have an unintended impact on aggregate payments to providers or the distribution of payments across providers.

Medicare uses the Medicare Severity - Diagnosis Related Groups (MS-DRGs) as the basis of payment in the Medicare inpatient prospective payment system (IPPS). The Center for Medicare and Medicaid Services (CMS) has posted an ICD-10 version of MS-DRGs on its website (CMS, 2012, A). The availability of both an ICD-9-CM and ICD-10 version of MS-DRGs can provide the basis for quantifying the impact on aggregate payments to hospitals and variation in impact by MS-DRG arising from the conversion of MS-DRGs to ICD-10.

This paper uses the ICD-9-CM MS-DRG version 30, the converted ICD-10 MS-DRG version 30, and FY 2013 MS-DRG weights to estimate the impact on aggregate payments to hospitals and the variation in impact by MS-DRG. It updates a 2011 report which used MS-DRGv28 and FY 2010 weights (Mills 2011). The FY 2015 weights and MS-DRG version 32 which will presumably be used during the first year of ICD-10 coding and reimbursement will be subject to the usual formal rule-making process, and may differ in both MS-DRG assignment and payment impact from the estimates herein obtained.

## Methods

*Creating an ICD-10 Database*

Since there is no large scale database available that contains diagnosis and procedure data coded in ICD-10, it was necessary to create a simulated ICD-10 database by using the General Equivalence Mappings (GEMs). The GEMs are a comprehensive translation dictionary between ICD-9-CM and ICD-10. Taking the complete meaning of a code as a single unit, the GEMs identify the most appropriate translation(s) to the other code set. There is an ICD-9-CM to ICD-10 GEM and an ICD-10 to ICD-9-CM GEM for both diagnoses and procedures. CMS has posted the GEMs on its website (CMS, 2012, B).

The database used to create the simulated ICD-10 data was the FY 2011 Medicare Provider Analysis and Review (MedPAR) data. The FY 2010 MedPAR database contained all Medicare inpatient claims from acute care hospitals with a discharge date in from 10/1/2009 through 9/30/2010. Non-IPPS hospitals were removed from the database, including skilled nursing facilities, long-term care hospitals, rehabilitation hospitals, psychiatric hospitals, critical access hospitals, children's hospitals, and oncology hospitals. Further, hospitals that had insufficient or inaccurate cost report information or with missing IME or DSH adjustment factors were also excluded from the database. Cases from IPPS hospitals in stand-alone units were also excluded. There were 10,759,276 inpatient claims coded in ICD-9-CM in the final selection.

For each MedPAR record in the database, a plausible ICD-10 record was created using the GEMs. Given the information available in the ICD-9-CM codes on the record, the objective of the translation of the record from ICD-9-CM to ICD-10 was to create a *correctly coded* ICD-10 version of the same record. Due to the increased specificity of ICD-10, a single ICD-9-CM code often translates to multiple ICD-10 codes in the GEMs. The translation process required selecting a single ICD-10 alternative from among the possible ICD-10 translations in the GEMs. A set of context specific translation rules was developed to automate the selection of the best possible ICD-10 translation alternative. The ICD-9-CM codes on a record were *not* translated one by one, but instead the entire contents of the record were taken into account in creating an ICD-10 coded version of the record. By evaluating the entire record as coded in ICD-9-CM, the selection of the ICD-10 codes that best represented how the record could be coded in ICD-10 was done in the context of the complete ICD-9-CM based description of the patient, thereby improving the accuracy of the ICD-10 replication of the record.

The context specific translation rules employed to create an ICD-10 coded version of the MedPAR database were as follows:

1. If an ICD-9-CM code is translated to only a single ICD-10 code in the GEMs, the ICD-9-CM code is translated to the corresponding ICD-10 code.
2. For single ICD-9-CM codes that translate to multiple ICD-10 alternatives, the ICD-10 to ICD-9-CM GEM is used in a reverse lookup to determine if any of the ICD-10 alternative codes also translated back to the ICD-9-CM code being translated. If such ICD-10 to ICD-9-CM translations were present, the possible ICD-10 code translations are limited to those alternatives. For example, in the GEMs ICD-9-CM code 250.40 (Diabetes with renal manifestations, type II or unspecified type, not stated as uncontrolled) translates to ICD-10 codes E11.21 (Type 2 diabetes mellitus with diabetic nephropathy), E11.22 (Type 2 diabetes mellitus with diabetic chronic kidney disease) and E11.29 (Type 2 diabetes mellitus with other diabetic kidney complication). Thus, there are three separate ICD-10 codes for type II diabetes with renal manifestations. In the ICD-10 to ICD-9-CM GEMs, only ICD-10 code E11.29 translates back to ICD-9-CM code 250.40 because E11.21 and E11.22 would require two ICD-9-CM codes to be coded in order to express their full meaning (i.e., additional codes for nephropathy or chronic kidney disease). Therefore, from the ICD-10 perspective, only E11.29 translates to code 250.40 in the GEMs and represents the best ICD-10 translation alternative for ICD-9-CM code 250.40.
3. Some ICD-9-CM procedure codes do not contain a specification of the anatomic site of the procedure. As a result such ICD-9-CM procedure codes translate to many anatomically specific ICD-10 procedure codes in the GEMs. In order to select among the anatomically specific ICD-10 alternative codes, the body system of the ICD-9-CM code reported as the principal diagnosis is used to select the best possible ICD-10 translation alternative. For example, ICD-9-CM code 92.27 (Implantation or insertion of radioactive element) has 263 possible anatomic site alternatives in ICD-10. If the principal diagnosis were a prostate diagnosis, the anatomic site for the ICD-10 radioactive element implant code translation would be the prostate.
4. Some diagnoses that can be coded as a single code in ICD-10 require multiple ICD-9-CM codes (a “cluster”) to be present on the record to express the same meaning. For example, ICD-10 diagnosis code L89.44 (Pressure ulcer of contiguous site of back, buttock and hip, stage IV) requires that four separate ICD-9-CM codes specifying the three ulcer sites and the stage be coded in order to replicate the full meaning of the ICD-10 code. When all the codes in an ICD-9-CM cluster were present on an ICD-9-CM coded record, the multiple ICD-9-CM codes in the cluster were translated to a single ICD-10 code.
5. Some ICD-9-CM codes contain a specification of multiple diseases or procedures. ICD-9-CM “combination” codes require multiple ICD-10 codes to be reported in order to replicate the ICD-9-CM codes on the record. When a combination code is present on an ICD-9-CM coded record, the translation process translated the code to multiple ICD-10 codes corresponding to the individual diseases or procedures contained in the ICD-9-CM combination code. For example, ICD-9-CM diagnosis code 038.12 (Methicillin resistant staph aureus septicemia), the translation process which includes both the diagnosis of staph aureus septicemia and the fact

that the organism is resistant to treatment with methicillin, translates to two ICD-10 codes, one corresponding to the staph aureus sepsis and the other corresponding to the resistance of the organism to antibiotics. ICD-9-CM procedure code 48.52 (Open abdominoperineal resection of the rectum), which includes both resection of the rectum and colostomy creation, translates to two ICD-10 codes, one corresponding to the resection of the rectum and the other corresponding to the creation of the colostomy.

6. Some diagnoses are gender-specific in ICD-10 but not in ICD-9-CM. When translating a non-gender-specific ICD-9-CM code whose corresponding ICD-10 codes are gender-specific, the gender of the patient reported on the claim is used to select the appropriate ICD-10 alternative.
7. Adjunct codes in ICD-9-CM are sometimes needed to fully specify a procedure (e.g., for a PTCA adjunct codes are used to specify the number of sites, number of vessels, whether a drug-eluting stent was used and whether the site was a bifurcation). Adjunct codes are not needed in ICD-10-PCS since a single ICD-10 codes contain all the information needed to describe all aspects of a procedure. Adjunct codes along with the ICD-9-CM underlying procedure code were translated to a single ICD-10 code.
8. ICD-10-CM coding rules differ from ICD-9-CM rules in determining which code is the principal diagnosis for select conditions involving a manifestation and an underlying cause. One clinical scenario is detectable in ICD-9-CM data: anemia in chronic disease. For example, when a patient has anemia secondary to chronic kidney disease, ICD-9-CM coding rules require that the anemia is coded as the principal diagnosis if it is the reason for the admission to the hospital, whereas ICD-10-CM coding rules require that chronic kidney disease is coded as the principal diagnosis when anemia due to chronic kidney disease is the reason for admission to the hospital. Principal and secondary diagnoses are switched on the ICD-10 record when this scenario is detected during translation.
9. Some ICD-9-CM diagnosis codes imply procedures while their ICD-10 counterparts do not. For example, V57.9, Care involving unspecified rehabilitation procedure, has no ICD-10 equivalent. The GEMs closest match is Z51.89, Encounter for other specified aftercare, which says nothing about a rehabilitation procedure. In ICD-10, coders will presumably supply rehabilitation procedures when they are documented in the medical record.

Once all of the context specific translation rules were applied, there could remain some ICD-9-CM codes on a record with more than one possible ICD-10 translation. In most instances, this was due to ICD-10 having axes of classification (e.g. laterality – left or right) or more detailed anatomic specificity than could be deduced from any of the ICD-9-CM codes on the record. Because the objective was to create an ICD-10 coded version of each record in the MedPAR data, it was necessary to select from among the remaining ICD-10 translations. However, which alternative translation was selected would not have an impact on MS-DRG assignment because the choices were among patient attributes that were not codeable in ICD-9-CM and therefore were not used to assign patients to different MS-DRGs. Since the native ICD-10 MS-DRGs were constructed to replicate the

native ICD-9-CM MS-DRGs, ICD-10 codes that differentiated patients based on attributes not contained in ICD-9-CM were all assigned to the same MS-DRG. For example, the operative approach used to reach the site of a procedure (e.g., open, percutaneous, etc.) is always specified in ICD-10 but rarely specified in ICD-9-CM. For an ICD-9-CM procedure code that lacked any specification of the operative approach, all the different ICD-10 operative approach codes for the corresponding ICD-10 procedure were assigned to the same ICD-10 MS-DRG. Thus, which operative approach is selected for the ICD-10 translation of the procedure code does not affect MS-DRG assignment. Since under these circumstances the selection from among ICD-10 alternative translations would have no impact on MS-DRG assignment, the final translation for the ICD-9-CM code was selected randomly from among the remaining possible ICD-10 translations using a uniform probability distribution. Approximately 19 percent of the ICD-9-CM code translations to ICD-10 required a random selection from among residual possible ICD-10 translations.

*Estimating Payment Impact*

Version 30 of the MS-DRGs was independently assigned to the FY 2010 MedPAR data as follows:

1. The ICD-9-CM MS-DRG grouper was used to assign the MS-DRGs to the source ICD-9-CM MedPAR data.
2. The ICD-10 MS-DRG grouper was used to assign the MS-DRGs to the ICD-10 version of the MedPAR data.

For each MedPAR record, the MS-DRG obtained from the original ICD-9 coded record ("the ICD-9 MS-DRG") was compared to the MS-DRG obtained from the ICD-10 translation of the same record ("the ICD-10 MS-DRG"). When the two MS-DRGs differed, an "MS-DRG shift" was said to occur. In those cases, the FY 2013 weight associated with the (shifted) ICD-10 MS-DRG could be compared with the FY 2013 weight associated with the ICD-9 MS-DRG and expressed as a percentage increase or decrease. When the ICD-10 MS-DRG weight was higher than the ICD-9 MS-DRG weight, the case "shifted to a higher weight MS-DRG" and when it was lower, the case "shifted to a lower weight MS-DRG".

Payment impact was estimated solely from the change in aggregate weight due to MS-DRG shifts and so is expressed in terms of a percentage increase or decrease from ICD-9 reimbursement, assuming that reimbursement is essentially proportional to MS-DRG weight. This methodology does not explicitly take into account outliers, short stays, or Medicare payment rules for operating and capital payment including wage index, disproportionate share hospital (DSH) and indirect medical education (IME) adjustments.

## Results

Slightly more than 99% of the cases showed no change in MS-DRG when coded in ICD-10.

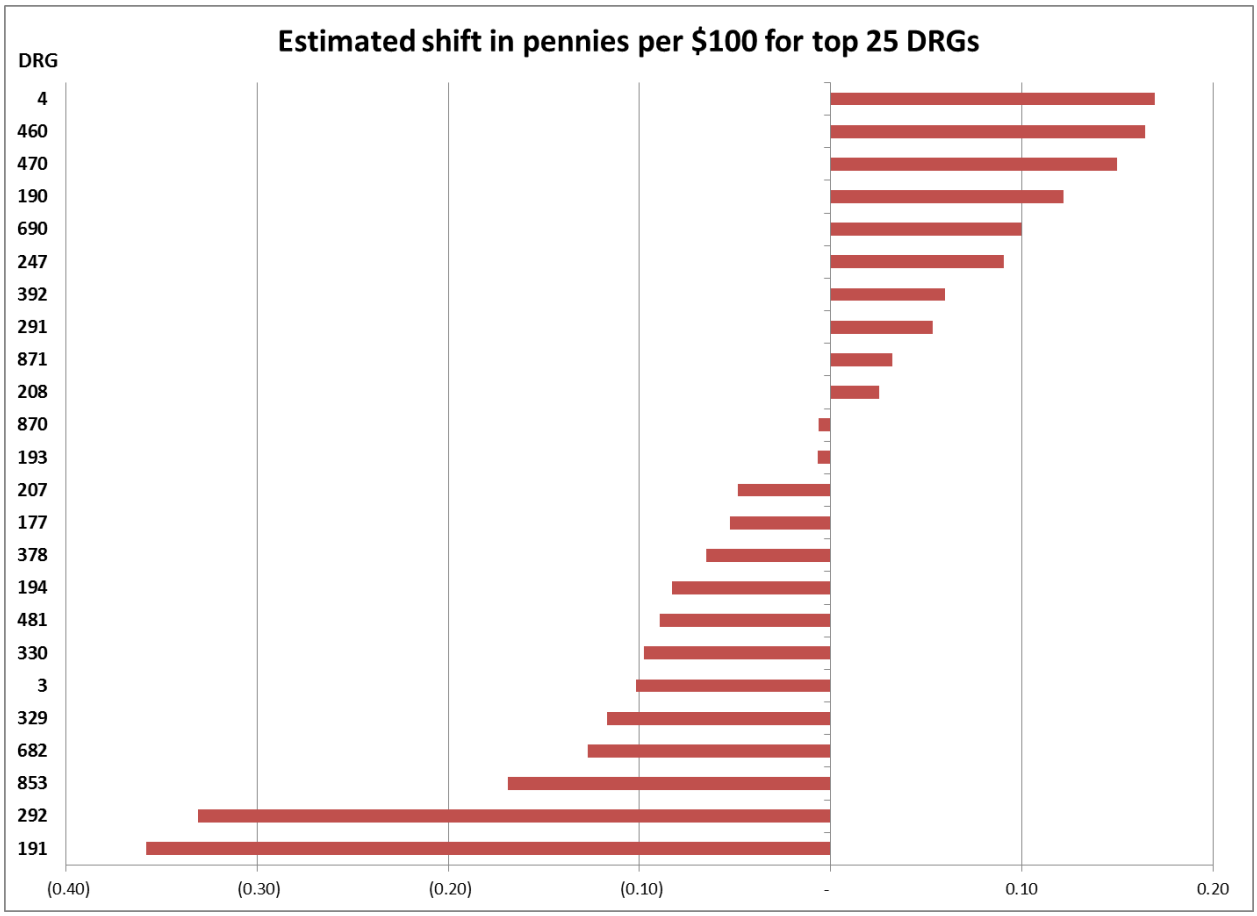
Of the 1% of the cases with MS-DRG shifts, 45% of those shifted to higher weight MS-DRGs and 55% shifted to lower weight MS-DRGs. The aggregate weight change of the

cases that shifted to higher weight MS-DRGs was 0.10% (one tenth of one percent or an approximate increase of 1/1000$^{th}$ of the ICD-9 reimbursement). The aggregate weight change of the cases that shifted to lower weight MS-DRGs was -0.14% (an approximate reduction of 14/10,000$^{th}$ of the ICD-9 reimbursement).

The net weight change of all MS-DRG shifts in the analysis was -0.04% (4 one-hundredths of a percent, or an approximate reduction of 4/10,000$^{th}$ of the ICD-9 reimbursement). This is equivalent to a loss of four pennies per $100 paid under ICD-9.

**Sensitivity to case mix**

Figure 1. Frequency and direction of shifts varied across MS-DRGs




The top 25 MS-DRGs, in terms of their contribution to the total sample MS-DRG weight, were plotted by their estimated contribution to the overall MS-DRG weight shift. The MS-DRG weight shift contribution for an MS-DRG is computed by adding up all of the FY2013 weights of the ICD-10 MS-DRGs for those cases for which the ICD-9 MS-DRG was the same(whether they shifted or not), and subtracting the product of the number of cases with the FY 2013 weight for that MS-DRG

For example, there were 135,624 cases of MS-DRG 191, Chronic obstructive pulmonary disease with CC, in the sample. Of those, 132,383 stayed MS-DRG 191, with weight 0.9521, when recoded to ICD-10. 2,112 cases shifted to MS-DRG 192 (weight 0.7072),

67 shifted to DRG 982 (weight 2.8276) and 82 shifted to MS-DRG 988 (weight 1.8141). The total ICD-10 weight for these 135,624 cases was 127,874 from (132,383 x 0.9521) + (2,112 x 0.7072) + (67 x 2.8276) + (82 x 1.8141) = 127,874. Under ICD-9, the total weight was 135,624 x 0.9521 = 129,128. Recoding in ICD-10 reduced the total weight of the MS-DRG 191 cases by 1,254, which was 0.0036 percent of the total weight of the sample.

Because some MS-DRGs tend to shift to higher weight MS-DRGs and others to lower weight MS-DRGs, the net change in expected reimbursement for an institution when claims are coded in ICD-10 depends on its case mix. Institutions with a greater frequency of the MS-DRGs like those in the lower half of Figure 1 may expect a greater reduction in reimbursement than 4/10,000$^{th}$ of current ICD-9 levels. Conversely, institutions with a greater frequency of MS-DRGs like those in the upper half of Figure 1 may expect less reduction in reimbursement, or even a slight increase in reimbursement, due to ICD-10.

**Sensitivity to ICD-10 coding quality**

The results reported above depend critically on the quality of the ICD-10 coding obtained from the translation of the ICD-9 MedPAR records. To demonstrate this, four different translation scenarios were run:

1. The translation used to produce the results described above, using all nine of the context specific translation rules listed above. MS-DRG shifts were observed to occur in only about 1% of the ten million cases in the MedPAR database.
2. The context specific translation rules listed above except numbers 4 and 7 – recognizing multiple ICD-9-CM diagnoses or procedures (clusters) that translate to a single ICD-10 diagnosis or procedure, respectively. When cluster recognition is removed from the translation the percentage of MS-DRG shifts increases to 3.1%.
3. As above (without 4 and 7) but also removing context specific translation rule 9. When the translation does not generate ICD-10-PCS procedures implied by ICD-9 diagnoses, the percentage of MS-DRG shifts increases to 3.5%.
4. As above (without 4, 7 or 9) but also removing context specific translation rule 2. When code translation is forced to be one-to-one – each ICD-9 code is translated as one and only one ICD-10 code – the percentage of MS-DRG shifts increases to 4.5%.

This last scenario – one-to-one translation – is the easiest to implement and thereby poses a risk for the unwary. Not only does the overall shift rate increase by four and a half times, but the effect of poor translation to ICD-10 is more pronounced in some MS-DRGs than in others. Under that scenario, projected reimbursement impacts in some cardiac MS-DRGs, for example, differ from our estimates by a factor of 50.

**Unavoidability of MS-DRG shifts**

The objective of the ICD-10 MS-DRG conversion project was to produce an ICD-10 version of MS-DRGs that replicated the ICD-9-CM version. Thus, for data coded in ICD-

10, the ICD-10 MS-DRGs would assign “the same MS-DRG had the same case been coded using ICD-9-CM codes” (CMS, 2010, C).

Since the ICD-10 MS-DRGs replicate the ICD-9-CM MS-DRGs, they do not take advantage of the increased specificity of ICD-10. If the ICD-10 MS-DRGs had been optimized for ICD-10, there could have been a substantial shift of patients across MS-DRGs making them inconsistent with the existing MS-DRG payment weights. Since there is no substantial database available coded in ICD-10, there would be no way of recalibrating the MS-DRG payment weights to correspond to ICD-10 optimized MS-DRGs. The converted ICD-10 database developed for this project created an ICD-10 database with records coded in ICD-10 but at a level of specificity corresponding to ICD-9-CM. In other words, the records were coded in ICD-10 based on only the information that is available within ICD-9-CM.

If the only difference between ICD-9-CM and ICD-10 were the increased specificity in ICD-10, then the replication would have been perfect. It would only be necessary for the ICD-10 MS-DRGs to ignore axes of classification not present in ICD-9-CM, and treat each ICD-10 code the same way its corresponding, less specific, ICD-9-CM code was treated in ICD-9 MS-DRGs. However, ICD-10 occasionally differs from ICD-9-CM in more complex ways, including:

1. Distinctions no longer in common use have been removed from ICD-10. Example: “malignant” vs. “benign” hypertension.
2. Some areas use a different approach to classification. Example: many Obstetric conditions are now classified by a patient attribute (trimester) instead of an encounter attribute (whether a delivery took place).
3. ICD-10-PCS procedure codes have no diagnostic content. Example: 0W8NXZZ, Division of Female Perineum, does not specify whether it was an episiotomy associated with a delivery or performed for some other purpose.
4. Some coding guidelines have changed. Example: anemia as manifestation of a chronic disease no longer coded as principal.

When one ICD-10 code specifies conditions separately classified in unique ICD-9-CM codes, it was necessary for the replicated ICD-10 MS-DRGs to choose how to treat it. The choice was usually made to treat it like the most frequently occurring ICD-9 code that it translated to in the GEMs. However, records coded with the less frequently occurring ICD-9 code or codes, but which would be indistinguishable in ICD-10, would now be treated differently by the ICD-10 MS-DRGs, and would thus become MS-DRG shifts.

For example, ICD-10-CM code F32.9, Major depressive disorder, single episode, unspecified, contains the conditions coded in ICD-9-CM using 296.20, Major depressive affective disorder, single episode, unspecified, and 311, Depressive disorder, not elsewhere classified. (“Depression”, without further specification, in the ICD-10-CM index sends the coder to F32.9.) The ICD-9-CM code 311 occurs ten times more frequently on hospital discharge abstracts than does 296.20, so the ICD-10 MS-DRGs must treat each occurrence of F32.9 in the same way the ICD-9 MS-DRGs treat 311. (In particular, 296.20 is a CC – Complication/Comorbidity – while 311 is not.)

Consequently, any ICD-9-CM record containing 296.20, which will have been coded in ICD-10 as F32.9, will be treated by the ICD-10 MS-DRGs as if it had contained 311 instead, which may lead to a DRG shift (loss of the CC if 296.20 were the only CC on the record).

**Top ten MS-DRG shifts**

Examination of the ten MS-DRGs with the highest frequency of shifting when re-coded in ICD-10 yields further examples of how unavoidable differences in the two classification systems lead to differences in MS-DRG assignment.

*1. MS-DRG 812, Red blood cell disorders w/o MCC.*

ICD-10-CM Guidelines chapter 2.I.4, p.29 states:

> When the admission/encounter is for management of an anemia associated with [a] malignancy, and the treatment is only for anemia, the appropriate code for the malignancy is sequenced as the principal or first-listed diagnosis followed by code D63.0, Anemia in neoplastic disease.

In ICD-9, most of these records listed anemia as principal diagnosis, and hence were assigned MS-DRG 812. Under ICD-10, the malignancy is listed first, which shifts these cases into generally higher weight cancer MS-DRGs.

*2. MS-DRG 981, Extensive O.R. procedure unrelated to principal diagnosis w/MCC.*

Most of the shifting is due to loss of an MCC, as illustrated below, leading to lower weight MS-DRGs, usually 982 or 983.

*3. MS-DRG 391, Esophagitis, gastroent & misc digest disorders w MCC.*

About 90% of the weight change is due to ICD-10-CM code K22.8, Other diseases of esophagus, which includes esophageal hemorrhage in its definition. Esophageal hemorrhage is a separate code 530.82 in ICD-9, assigned to MS-DRG 368. 530.89, Other disorders of esophagus, is assigned to MS-DRG 391. Their frequency data is similar, so K22.8 takes the DRG attributes of the ICD-9 closest match 530.89, which not an MCC. When there is no other MCC on the record the case shifts to a lower weight MS-DRG.

*4. MS-DRG 885, Psychoses.*

Under ICD-9 these cases had principal diagnosis 296.20, Major depression, unspecified. This becomes F32.9 in ICD-10, which includes Depression NOS (311 in ICD-9) so F32.9 shifts the case to the lower weight MS-DRG 881, Depressive neuroses.

*5. MS-DRG 066, Intracranial hemorrhage or cerebral infarction w/o CC/MCC.*

ICD-10 secondary diagnosis I63.59, Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery, is coded when either 433.31 or 433.81 would be coded in ICD-9. While 433.31 is excluded as CC by the principal diagnoses assigned to DRG 066, 433.81 is not. The closest matching translation for I63.59 is 433.81, so I63.59 takes the DRG attributes of 433.81, which means it is not excluded. MS-DRG 066 cases with 433.31 on their ICD-9 record go to the higher weight MS-DRG 595 under ICD-10.

*6. MS-DRG 191, Chronic obstructive pulmonary disease with CC.*

82% of the shifts are due to ICD-10 not differentiating sub-types of COPD the way ICD-9 does. ICD-9 has unique codes for an acute exacerbation of obstructive chronic bronchitis (491.21, 491.22) and unspecified acute exacerbation of chronic obstructive asthma (493.21, 493.22). All are on the CC list in ICD-9 MS-DRGs, and when two such codes are on the record and one is listed as principal diagnosis the MS-DRG assigned is DRG 191 Chronic obstructive pulmonary disease with CC.

For a diagnosis of COPD with acute exacerbation there is just one code in ICD-10, J44.1, Chronic obstructive pulmonary disease with (acute) exacerbation, which includes patients with the diagnoses of chronic obstructive bronchitis, chronic obstructive asthma as well as chronic obstructive pulmonary disease. Therefore, an ICD-10 coded record for a patient with multiple COPD sub-types documented will still only have one code on the record, and if listed as the principal diagnosis will be assigned to the lower weight MS-DRG 192 Chronic obstructive pulmonary disease without CC/MCC.

In approximately half of all hospital admissions for COPD exacerbation, the specific cause is pneumonia, and the diagnosis is more accurately coded using ICD-10 code J44.0 Chronic obstructive pulmonary disease with acute lower respiratory infection, instead of J44.1. If documented as the cause of the COPD exacerbation, pneumonia can be coded in addition to J44.0. Most viral and bacterial pneumonias (see codes in categories J12-J18) are on the ICD-10 MCC list.

*7. MS-DRG 011, Tracheostomy for face, mouth and neck diagnoses with MCC.*

Tracheostomy was not coded separately when performed as part of ICD-9 procedure 304, Radical laryngectomy, but it is coded separately in ICD-10-PCS. The explicit code for Tracheostomy puts the case in the higher weight MS-DRG 003.

*8. MS-DRG 974, HIV with major related condition and MCC*

Most of the MS-DRG 974 shifts are due to an unavoidable difference in the way ICD-10 classifies sepsis. A correctly coded ICD-9 record requires two codes to fully specify sepsis due to an organism: one code for the septicemia organism and a second code for the clinical condition of sepsis (e.g., 038.41 Septicemia due to hemophilus influenzae and 995.91 Sepsis). Both codes are on the MCC list in ICD-9 MS-DRGs, but 995.91 is excluded as an MCC when HIV is listed as principal diagnosis. However, since 038.9 is not excluded, a record with HIV as principal diagnosis and *both* 038.9 and 995.91 is assigned to DRG 974 HIV with major related condition with MCC.

Sepsis codes in ICD-10 (category A41 et al) specify both the septicemia organism and the clinical condition of sepsis in one code. Therefore, a correctly coded ICD-10 record requires only one sepsis code (A41.3 Sepsis due to Hemophilus influenzae). In ICD-10 MS-DRGs, when HIV is listed as principal diagnosis, A41.3 as a secondary diagnosis is excluded as an MCC, because its closest matching ICD-9 translation, 995.91, is likewise excluded in ICD-9 MS-DRGs.

*9. MS-DRG 292, Heart failure and shock with CC.*

MS-DRG 292 occurs about 22 times per thousand Medicare cases. Shifts occur for ten different reasons, mostly having to do with the loss of the CC, but one reason accounts

for 67% of the shift and 80% of the aggregate weight reduction: malignant hypertension. It is classified with its own unique code in ICD-9 (401.0). It and a related code (402.00 Malignant hypertensive heart disease without heart failure) are on the list of CCs in ICD-9 MS-DRGs. ICD-10 does not classify the concept of malignant hypertension as a distinct clinical condition, so there are no comparable ICD-10 codes specifying malignant hypertension on the CC list in ICD-10 MS-DRGs.

*10. MS-DRG 037, Extracranial procedures with MCC.*

Same explanation as for MS-DRG 066, above.

## Conclusions

Although the transition from the ICD-9-CM version of the MS-DRGs to the ICD-10 version of the MS-DRGs is expected to result in 1% of the patients being assigned to different MS-DRGs, payment increases and decreases due to a change in DRG assignment are estimated to essentially net out. Aggregate payments to hospitals are estimated to change by -0.04 percent. The estimates are sensitive to case mix and to the rules used to translate ICD-9 coded records to ICD-10. MS-DRG shifts due to re-coding in ICD-10 are caused by unavoidable differences between the two classification systems.

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