

Total Joint Replacement

Changes in Medicare diagnosis related group (DRG) system for primary and revision hip and knee replacements and their implications on hospital reimbursement

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ABSTRACT

Medicare provides payments to hospitals for services they have provided through a patient classification system of Diagnosis Related Group (DRG). To achieve more equitable reimbursement, Medicare has made substantial changes to the DRG system for hip and knee replacements in recent years. The objective of this paper was to describe the implications of the changes in the Medicare coding system on hospital reimbursement for these procedures. Until 2005, the DRG code was the same for primary and revision hip and knee replacements. Because revisions are more costly procedures than primary replacements, Medicare implemented two separate DRG codes for primary and revision surgeries. In 2006, the amount of reimbursement for a revision procedure was approximately 26% higher than the amount of reimbursement for a primary replacement at the same facility. Beginning in fiscal year 2008, a newer Medicare Severity (MS) DRG system was placed in use. Under the newer MS-DRG system, in addition to the replacement type (primary or revision), Medicare now considers the severity of illness in its reimbursement policies. Hospitals treating patients with secondary diagnoses that drive up the cost of care are compensated at increased rates. For a given facility, the amount of reimbursement for a primary replacement would be approximately 64% higher for the sicker patient. Reimbursement is expected to be shifted to hospitals serving and documenting more severely ill patients. For the sustainability of hospital care in the hospitals taking care of the most severe cases, quality clinician documentation is more important than ever.

Keywords

Medicare, reimbursement, total hip arthroplasty, total knee arthroplasty

INTRODUCTION

The largest single component of health expenditure in the United States (U.S.) is the expense of hospital care.¹ The health spending of the civilian non-institutionalized population during 2006 was approximately \$1.03 trillion, and hospital inpatient expenses accounted for nearly 30% of total expenses.¹ Primary hip and knee replacements are the most frequent elective inpatient surgeries in the U.S.² Since 1990, the number of joint replacements performed has been increasing steeply.³⁻⁵ As joint replacements have become more prevalent, the economic burden resulting from these surgical procedures has grown. In the year 2004, approximately 26 billion dollars were charged by hospitals in the U.S. for nearly 730,000 hip/knee replacement procedures.⁴

Medicare is the single largest payer for joint replacements, and other payers often use the Medicare reimbursement system as a benchmark to determine hospital and physician payments. Previous studies have reported that Medicare reimbursement for hip/knee replacement procedures resulted in financial losses for some hospitals performing these procedures.^{4,6,7} In an effort to better reflect the level of resources used, Medicare has made changes to the hospital reimbursement system for primary and revision hip and knee replacement surgery. Understanding of the hospital reimbursement system is significant for the sustainability of hospital care. The objective of this paper was to describe the implications of the changes in the Medicare coding system on hospital reimbursement for these procedures.

I. Medicare Hospital Reimbursement Process

A brief review of important concepts of the hospital reimbursement system is outlined in this section. Our review is focused on the Medicare Part A, which covers inpatient care. Physician fees, reimbursed under Medicare Part B, are beyond the scope of this paper.

Hospital Cost, Charge, and Reimbursement

Hospital cost in this database is the actual direct and indirect expense accrued in patient care and does not include physician fees. Hospital cost is a main factor in the determination

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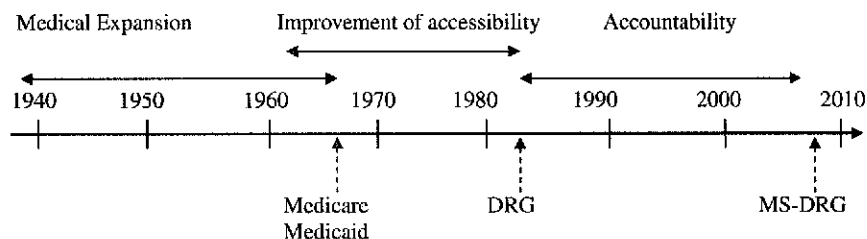


FIGURE 1. Time line of important events in medical care system in the United States. DRG indicates diagnosis-related groups system as a cost containment effort against excessive hospital expenditures; MS-DRG, medicare severity-adjusted DRG.

of hospital charge. To reflect hospital profits and the necessity of recovering the costs of uncompensated care, hospital charge is calculated by multiplying the hospital cost by each hospital's (or each department's) charge-to-cost ratio. For instance, if the actual hospital cost is \$10,000 and the hospital's charge-to-cost ratio is 2.0, the hospital charge would be \$20,000. As another example, if a hospital's charge-to-cost ratio is 3.0 for the same cost, the hospital charge would be \$30,000. Thus, hospital charges are basically what the hospital billed for the care and they do not necessarily reflect the actual amounts of hospital resources used. For hospitals that performed total joint replacements in 2006, the hospital charge was roughly 2.5 times higher than hospital costs.⁸

Under the current price-per-case reimbursement system, the actual hospital reimbursement is based on neither hospital cost nor hospital charge. The amount of Medicare reimbursement is predetermined by Centers for Medicaid and Medicare Services (CMS). Hospitals have no ability to negotiate reimbursement for Medicare or Medicaid patient care.

Emergence of the Diagnosis-Related Group (DRG) System

As the health care system in America became more complex, new ways of managing expenditures were created. A time line of important events in medical care system is sketched in Figure 1. Beginning in the late 1940s, the medical care system experienced rapid growth, and this expansion of the system continued through the 1960s.⁹ Alongside medical expansion, third party coverage increased. In the 1960s and 1970s, public policy was focused on improving access to health care. With the passage of Medicare and Medicaid legislation in 1966, the vast majority of Americans had some form of medical insurance. In 1980, nearly 92 percent of health care expenses in the U.S. were paid by third parties such as the government and insurance companies.¹⁰ Unfortunately, rapidly growing medical costs became a major burden to the third parties. Thus, the federal government had to control the skyrocketing health expenditures.

In the early 1980s, the Social Security program experienced a serious short-term financing crisis and President Ronald Reagan appointed a blue-ribbon panel (more popularly known as the Greenspan Commission) to study its financing issues and recommend legislative changes.¹¹ This amendment to Social Security was signed into laws in 1983 (Public Law 98-21), which is when Medicare's DRG-based hospital financing system became effective,¹² with the goals of controlling the growth of hospital costs and making

hospitals more accountable for their productivity (Figure 1). Under the new hospital financing system, patients were grouped by the DRG system for reimbursement purposes. The patients within each DRG category are clinically similar and are expected to use the same level of hospital resources. Regardless of the health service cost to the hospital, each case within a given DRG category leads to the same Medicare reimbursement, a contrast from the previous method of reimbursement based on accrued costs. Hence, the price-per-case reimbursement is referred to as the inpatient prospective payment system (IPPS).

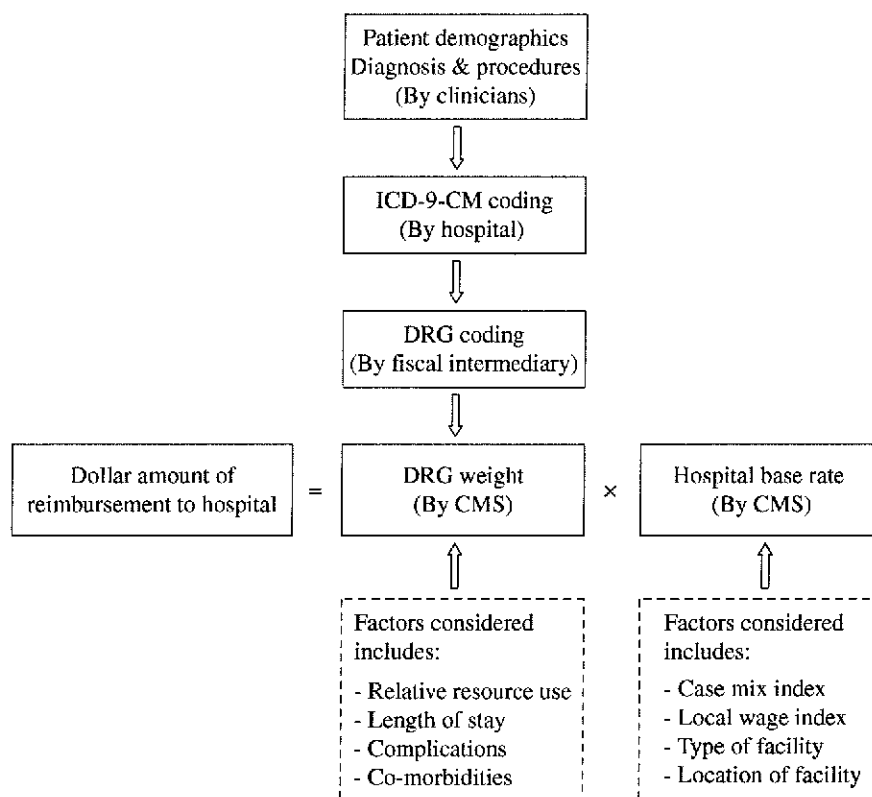
Basic components of the IPPS system are outlined in Figure 2. A detailed flow chart that reflects various adjustments is published elsewhere by the Medicare Payment Advisory Commission (MedPAC), which was set up to advise the Congress on various Medicare issues.¹³ Further reimbursement details concerning add-on payments and outlier payments can be found on the CMS website.¹⁴

DRG Assignment

The foundation of the DRG code is the patient medical record as documented by clinicians (Figure 2). By reviewing a medical record for all pertinent diagnoses present and procedures performed during a patient's hospital stay, a hospital's medical records department assigns diagnostic and procedure codes from the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). The hospital then forwards the data to its fiscal intermediary,¹⁵ a private insurance company that has contracted with Medicare, to process bills and pay claims for inpatient services. The fiscal intermediary reviews the data and classifies each case into a DRG numerical classification system. Hospitals may assign DRGs to cases for internal use. However, the DRG used for actual payment is assigned by the fiscal intermediary. Although the principal diagnosis is often the basis for DRG coding, surgical procedures always take precedence over diagnosis codes when finalizing the DRG code.

DRG Weight

The DRG weight, carried to four decimal places, reflects the level of resource use relative to the average level of resource use for all Medicare patients. A DRG weight of 1.0000 reflects an average amount of resources expected to be used for a specific DRG compared to that of all Medicare patients. The higher the weight, the more resources the patient is expected to use. Therefore, the reimbursement amount of hospital care is heavily based on the DRG weight of each



ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification
 DRG: Diagnosis-Related Groups
 CMS: Centers for Medicare and Medicaid Services
 Solid line box indicates process
 Dotted line box indicates the factors considered

FIGURE 2. Basics of typical hospital reimbursement process if the case is not an outlier. CMS indicates centers for Medicare and Medicaid services; Dotted line box indicates the factors considered; DRG, Diagnosis-Related Groups; ICD-9-CM, International Classification of Diseases, ninth revision, clinical modification; Solid line box indicates process.

case. For instance, a DRG with a weight of 2.0000 is paid twice as much as a DRG with a weight of 1.0000. CMS assigns a relative weight to each DRG code every year.¹⁶ In 2005, the DRG weight for hip or knee replacement was 2.0332.¹⁶ Given the important role of DRG weight in the reimbursement system, accurate documentation of surgical procedure and DRG coding is crucial in calculating correct hospital reimbursement.

Hospital Base Rate and Case Mix Index

Medicare assigns to each hospital a standardized dollar amount (known as hospital base rate or blended rate) every year and this rate is a major factor in calculating a hospital reimbursement for a given DRG case. Basic hospital payment for any hospitalization is, roughly, the DRG weight multiplied by the hospital base rate, unless the case is an outlier (Figure 2). For a hospitalization case with a DRG weight of 2.0000; the reimbursement would be \$10,000 for a hospital with a base rate of \$5000, but the reimbursement would be \$16,000 for a hospital with base rate of \$8000. The hospital base rate depends on a hospital's Case Mix Index (CMI), local wage index, type of facility, geographical location of

institution, and so on (Figure 2). Among all factors, a hospital's CMI is the most important factor in calculating the hospital base rate.

The CMI of each hospital (or facility) is an average of the DRG weights of all Medicare hospitalizations in that hospital for a specific period of time. For example, if a total of five patients hospitalized had DRG weights of 1.3831, 0.9046, 2.6462, 1.4462, and 1.2038, then the CMI index of this hospital would 1.5168 [= (1.3831 + 0.9046 + 2.6462 + 1.4462 + 1.2038)/5]. For the hospital that admits 10,000 Medicare patients per year, its CMI is the average of 10,000 DRG weights. Because the CMI indicates the relative severity of a patient population, it reflects the resource-use intensity of all Medicare patients. A hospital with a CMI of 1.0000 reflects an average resource-use intensity of their patient group compared with all Medicare patients. The higher the CMI, the higher the assigned hospital base rate is. In the aggregate, a small amount of change in CMI has a large effect on aggregate payments and on the distribution of payments across hospitals. The significant role of CMI on reimbursement encourages hospitals to admit sicker patients. Major teaching hospitals' base rates are typically higher because they generally admit more severely ill patients.

After the implementation of IPPS, there has been a dramatic increase in the CMI for hospitals.¹⁷ A study that examined the case-mix change during the early years of IPPS reported that much of this increase may be attributed to more thorough and accurate documentation.¹⁷ However, the reimbursement system has been abused by falsified CMI reports. "DRG creep" is a term used to describe a change in the CMI for a hospital where the true severity of cases the hospital treats has not changed. It is also a well-recognized fraudulent method of boosting hospital income where the assignments of the diagnosis codes are not substantiated by the document in the medical record.

II. Separate DRG Codes for Primary and Revised Replacements

Prior to October 2005, Medicare reimbursed hospitals for both primary and revision hip/knee replacements under a single DRG (209—Major joint and limb reattachment procedures of lower extremity, Table 1). In 2005, the relative weight for the DRG 209 was 2.0332,¹⁶ which means that total joint replacement utilizes approximately twice the amount of resources compared to that of all Medicare patients. On average, the actual reimbursed amount was \$10,034 throughout the nation regardless of whether it was a primary or revision surgery.

Because joint revisions are known to be more costly procedures than primary replacements,¹⁸ CMS eliminated DRG 209 and created two new DRGs: 544 (Major joint Replacement or Reattachment of Lower Extremity) and 545 (Revision of Hip or Knee Replacement).¹⁹ These codes went into use beginning in October 2005. In 2006, the DRG weight was 1.9643 for primary replacements and 2.4827 for revisions (Table 1). Therefore, the amount of reimbursement for a revised replacement was approximately 26% higher than that of the primary procedure for a given hospital. According to CMS, the actual national average Medicare reimbursement for primary replacements and revision replacement procedures was \$11,916 (DRG 544) and \$15,552 (DRG 545), respectively.² On average, the actual reimbursement for revisions was approximately 31% more than that of primary replacements. In terms of dollar amounts, this translates to a reimbursement difference of nearly \$3636.

III. Medicare Severity DRG Codes for Hip and Knee Replacements

The Medicare DRG system was intended to reward hospitals for being more accountable for their productivity. Unfortu-

nately, however, the Medicare DRG's fixed price approach rewarded the hospitals that were seeking less-ill patients because of correspondingly low resource consumption. To more accurately reflect the degree of hospital resource use in reimbursement, CMS split the DRGs into three different categories based on the severity of illness. Under this newer Medicare Severity-adjusted DRG (MS-DRG), Medicare payments to hospitals that treat sicker patients have been increased. The MS-DRG, published in the Federal Register on August 22, 2007,²⁰ came into use in the 2008 fiscal year. In this document, hip and knee replacement information is found under Major Disease Category 8 (Disease and Disorders of the Musculoskeletal System and Connective Tissue).

As shown in Table 2, hip and knee replacements are classified into three groups: complications or comorbidities (CC), major complication or comorbidities (MCC), or without MCC/CC (Non-CC). A "complication" is a pathological condition that develops during the patient's stay, and a "comorbidity" is a condition that is present upon admission. From the reimbursement perspective, examples of CCs relevant to hip and knee replacements include: dislocation of hip or knee, open wound, blood loss anemia, malnutrition, hyponatremia, urinary tract infections, deep vein thrombosis, post-operative hematoma, and chronic systolic or diastolic heart failure.²¹ Examples of MCCs relevant to hip and knee replacements include pulmonary embolism and myocardial infarction, acute renal failure, septicemia or sepsis, pneumonia, and acute or acute on chronic systolic or diastolic heart failure.²²

MS-DRG Weight for Primary Hip or Knee Replacements

The MS-DRG for primary hip/knee replacements is subdivided into two severity levels (MS-DRGs 469 and 470). If a patient who received primary joint replacement has an MCC, the MS-DRG code would be 469²⁰ and its DRG weight would be 3.2901 as of 2009 (Table 2).¹⁶ Considering that the DRG weight in 2006 for primary replacements was 1.9643 (Table 1), Medicare payments to hospitals that treat sicker patients have increased significantly. For a given facility, the amount of reimbursement for a primary replacement would be approximately 64% higher for the sicker patient (Table 2). As shown in the Table 2, the MS-DRG for primary replacement is affected by the presence or absence of an MCC but not a CC. However, it remains crucial to fully report CCs because the additional conditions may affect the severity of illness and risk of mortality indicators that are also assigned and translated into other external statistics for facilities and physicians that payers review.

TABLE 1. Historical Diagnosis Related Group (DRG) Code and relative weight for hip and knee replacements in the United States

Year	2003	2004	2005	2006	
	Primary/revision replacements	Primary/revision replacements	Primary/revision replacements	Primary replacements	Revision replacements
DRG code	209	209	209	544	545
DRG weight	2.0782	2.0327	2.0332	1.9643	2.4827
Average Medicare reimbursement	\$9681	\$9839	\$10,034	\$11,916	\$15,552

TABLE 2. Medicare Severity Diagnosis Related Group (MS-DRG) Code and relative weight for hip and knee replacements in the United States

Arthroplasty type	DRG code	DRG code title	DRG weight for fiscal year	
			2008	2009
Primary	469	Major joint replacement or reattachment of lower extremity with MCC	2.6664	3.2901
	470	Major joint replacement or reattachment of lower extremity without MCC	1.9871	2.0077
Revision	466	Revision of hip or knee replacement with MCC	3.5408	4.5431
	467	Revision of hip or knee replacement with CC	2.7523	3.0630
	468	Revision of hip or knee replacement without CC	2.4545	2.4500
Bilateral	461	Bilateral or multiple major joint procedures of lower extremity with MCC	3.8345	4.5419
	462	Bilateral or multiple major joint procedures of lower extremity without MCC	3.0993	3.1438

Beginning fiscal year 2008, a newer Medicare Severity DRG (MS-DRG) system came into use.

DRG weight was found from the Centers for Medicare and Medicaid Services.

CC indicates complications or comorbidities; MCC, major complications or comorbidities.

MS-DRG Weight for Revised Hip or Knee Replacements

The MS-DRG for revision hip or knee replacements is subdivided into three severity levels by the presence of a CC or MCC (MS-DRGs 466, 467, and 468), and their DRG weights vary significantly (Table 2). Compared with a patient without a CC, for a given hospital, the amount of reimbursement for revision replacements would be approximately 25% higher for a case with a CC and approximately 85% higher for a case with a MCC. For instance, if a revision hip arthroplasty case had severe malnutrition that drives up the cost of care, the reimbursement would be approximately 25% higher than a case without this condition. Thus, lack of detailed documentation and coding can lead to a significant loss of payments for hospitals with a large Medicare population.

Surprisingly, the Medicare DRG codes do not distinguish between the cost of primary and revision joint replacements if a simultaneous bilateral arthroplasty is performed (Table 2). For example, in the case of a unilateral arthroplasty with an MCC, the amount of reimbursement for a revision would be approximately 1.38 times (= 4.5431/3.2901) that of a primary procedure. However, in the case of a bilateral procedure, the amount of reimbursement from Medicare would be identical regardless of bilateral primary or revision cases. Although bilateral revision is not common and such a scenario seems unlikely, from a hospital's perspective, performing simultaneous bilateral revision replacements under the current reimbursement scheme could lead to a substantial loss of revenue.

MS-DRG and Hospital Acquired Conditions

In an effort to regulate quality of care, beginning in the 2009 fiscal year, Medicare removed some Hospital Acquired Conditions (HAC) from the MS-DRG assignment if they were not present on admission.^{23**} These include: (1) extreme manifestations of poor control of blood sugar levels (ie, diabetic coma), (2) surgical site infections following certain elective procedures including certain orthopedic surgeries and bariatric surgery for obesity, and (3) deep vein thrombosis (DVT) or pulmonary embolism (PE) following total knee replacement and hip replacement surgeries.²³ The objective behind this change is to allow savings by eliminating the extra costs of treating "reasonably preventable" complications.

For example, if a DVT is noted on admission, it would still count as a CC. If it were a HAC following hip or knee replacement, it would be removed when calculating the reimbursement to the hospital. According to CMS, when this change was proposed and posted by CMS, the majority of dissent emphasized the inability to determine whether DVT/PE was present on admission.^{23**} A large percentage of patients with DVT/PE are asymptomatic, and hospitals do not routinely screen for the presence of DVT/PE as part of the diagnostic test panel on admission. However, in spite of these concerns, CMS chose to include DVT/PE as an HAC unless it was recognized prior to admission.^{23**}

CONCLUSION

Total hip and knee replacements continue to be one of the most successful surgeries in the world. In the United States, by the year 2015, the annual numbers of primary hip and knee replacements will be greater than 0.5 million and 1.3 million, respectively.⁴ The majority of patients undergoing these procedures are over age 65 and often covered by Medicare. Medicare provides payments to hospitals for services through a patient classification system of DRG. Based on the Medicare DRG code of a given case, a hospital has been reimbursed a preset amount, regardless of the actual health service costs associated with a given case. Under the newer MS-DRG system, hospitals treating patients with secondary diagnoses that drive up the cost of care are compensated at increased rates. By making a detailed recording of secondary diagnoses, hospitals have a greater opportunity to code complications or comorbidities that may result in assigning a given case to a higher weighted DRG. Furthermore, Medicare no longer assigns an inpatient case to a higher paying MS-DRG if certain conditions were not documented on admission. Under the current MS-DRG system, the role of the clinician in preparing detailed and accurate documentation is critically important for getting an accurate DRG code assignment and ultimately the hospital's reimbursement.

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