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Bundled Payments and Big Data

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Big data can help healthcare providers determine what factors drive total episodic cost and whether those cost drivers can be controlled.

Big data plays an increasingly important role in countless fields, and health care is no exception. The analysis of big data helps healthcare organizations deal with the challenges of combining complex medicine and complex economics. One important example is the use of big data analysis in understanding the cost drivers related to bundled payments.

Defining Bundled Payment

The Bundled Payments for Care Improvement program was officially launched in January 2013. It tests alternative models for creating bundled payments for 48 clinical episodes of care that are defined by patients' Medicare severity DRG (MS-DRG). On July 9, 2015, the Centers for Medicare & Medicaid Services (CMS) proposed a bundled payment model for hip and knee replacements—Comprehensive Care for Joint Replacement (CCJR)—that would require mandatory participation for most hospitals in 75 metropolitan areas in the United States. The proposal is set to begin on Jan. 1, 2016, and continues CMS's trend to shift more risk to providers.

A bundled payment can best be described as a method for shifting payment risk between healthcare providers and healthcare consumers, usually third-party payers. There are four critical dimensions of bundled payment:

> Unit of payment
> Number of providers
> Time period
> Risk sharing among providers

Unit of payment. The unit of payment defines the collection of services that will be combined or bundled to trigger a payment. There are four payment unit categories.

At the lowest combination level are individual service arrangements, where each specific service provided is paid separately. Traditionally, almost all healthcare services were paid on this basis. Even the original Medicare program for hospitals, which paid on a cost basis, used the services provided in the claim as the basis for payment.

The next level of combination is the encounter level. Here a payment is made for all of the services bundled into an encounter. In the hospital sector, this includes a case payment based on the MS-DRG for inpatients. The payment is still provider specific, but there is a shifting of risk from payer to provider because the payment is the same

Claims Data for Medicare Patients

Name of File	Scope
Standard Analytical Inpatient File	All traditional IP claims from hospitals
Standard Analytic Outpatient File	All traditional OP claims from hospitals
Standard Analytic Home Health File	Claims submitted by home health agencies
Standard Analytic Hospice File	Traditional and HMO claims from hospices
Standard Analytic Skilled Nursing File	All traditional claims from skilled nursing facilities
Carrier File	CMS-1500 claims from non-institutional providers (5% sample)
Durable Medical Equipment File	Claims from durable medical equipment suppliers (5% sample)

CMS provides claims data for all Medicare patients.

regardless of the intensity of services provided during the encounter. For example, a hospital being paid at the encounter level receives no additional payment for larger amounts of ancillary services.

The next level of bundling is the episode level. At this level, payment is made for all encounters associated with a defined episode of care. The episode level shifts payment risk further to providers and away from payers because the provider is now responsible for not just the initial encounter, but any related encounters associated with that episode of care. At the episode level, the question arises about how to handle multiple providers involved in a single episode.

The final level of bundling is capitation. Risk is now fully shifted to the providers. A capitation plan may be limited to one area of service, such as hospital care, or may involve multiple areas of care.

Number of providers. The number of providers involved is closely related to the payment unit. In individual service arrangements, the only provider involved is the one who provides the services. In an encounter arrangement, there may be multiple providers. For example, physician services provided in a hospital setting would constitute an encounter arrangement. In most current situations, the physician and the hospital submit separate claims for services provided in the encounter, although combined billing is also a possibility. In an episodic payment arrangement, multiple providers are often combined. Multiple providers are also frequently involved in capitation arrangements.

Time period. The time period covered in an individual service or encounter payment arrangement is usually short and is limited to the actual encounter or visit. In an episodic arrangement, the time period often extends 30 to 90 days after the initial visit. For example, CMS's CCJR proposal covers 90 days after hospital discharge. Capitation is almost always on an annual basis.

Risk sharing among providers. Risk sharing involves identifying which providers will assume losses or realize gains. Episodic payment may involve multiple risk-sharing partners. CMS's CCJR proposal allows for joint sharing, but in the absence of any formal arrangement, the hospital is the designated risk-sharing provider. Capitation is similar to episodic payment in that multiple risk-sharing partners can be involved. The critical element in devising risk-sharing arrangements is determining how the eventual gains or losses will be shared among the parties.

For example, CMS may determine that the average expected payment for MS-DRG 470 is $35,000 in a specific region that includes all providers (i.e., the hospital, physician, and all other post-acute care providers). If CMS makes total payments of $45,000 for a specific MS-DRG 470 episode to all providers, the hospital would be

Payment Comparison of MS-DRG 469 and MS-DRG 470

	MS-DRG 469	MS-DRG 470
Inpatient admission	$22,426	$14,213
Subsequent related admission	$7,502	$2,393
Home health	$1,933	$1,834
Hospice	$411	$60
Hospital outpatient	$1,673	$754
Skilled nursing	$9,796	$4,420
Physician/physical therapy/other	$6,423	$3,833
Durable medical equipment	$206	$159
Total payments	$50,370	$27,763

Source: Cleverley and Associates. Used with permission.

Costs are substantially higher for MS-DRG 469 than MS-DRG 470.

MS-DRG 470 and MS-DRG 469 Payments by Procedure

	MS-DRG 470 Payments by Procedure			MS-DRG 469 Payments by Procedure		
	Partial Hip	Total Hip	Total Knee	Partial Hip	Total Hip	Total Knee
Inpatient admission	$14,278	$14,369	$14,125	$23,387	$22,032	$20,704
Subsequent related admission	$6,356	$2,287	$1,708	$8,112	$6,896	$6,684
Home health	$1,883	$1,947	$1,770	$1,821	$2,023	$2,100
Hospice	$492	$15	$2	$661	$206	$42
Hospital outpatient	$761	$581	$838	$1,395	$1,795	$2,166
Skilled nursing	$13,643	$3,871	$2,976	$12,635	$8,701	$4,651
Physician/physical therapy/other	$5,052	$3,698	$3,833	$6,802	$6,051	$5,912
Durable medical equipment	$157	$106	$185	$185	$216	$241
Total payments	$42,623	$26,875	$25,437	$54,998	$47,920	$42,499

Source: Cleverley and Associates. Used with permission.

Partial hip replacements are more costly than total hip replacements.

responsible for the difference between the actual payment ($45,000) and the CMS expected payment ($35,000). The hospital could negotiate risk-sharing relationships with the other providers, but in their absence, the hospital is the ultimate risk taker. In an integrated delivery system with single ownership, this is less of an issue, but in non-owned provider entities, sharing of profit and loss can be problematic.

Using Big Data to Identify Cost Drivers

Assessing and defining costs associated with episodic payments clearly fall into the area of big data. For example, the CCJR proposal combines payments to the hospital and physician for the initial encounter and all post-acute care related to the encounter for the next 90 days. The hospital, unless it arranges for joint risk-sharing arrangements, is responsible for controlling the costs of care in settings over which they may not have any direct control.

A critical first step in understanding and managing this cost is to define the drivers of total cost and establish relevant benchmarks to use in controlling those costs. The cost of an episode of care is the sum of the costs of all providers involved in delivering care during the episode.

In the CCJR proposal, cost is defined as Medicare payments. Building realistic standards of costs involves obtaining and analyzing prior claims for the episode. In the CCJR proposal, this would be MS-DRG 469 (major joint replacement or reattachment of lower extremity with major complication or comorbidity) and MS-DRG 470 (major joint replacement or reattachment of lower extremity without major complication or comorbidity). Medicare claims data are available from CMS in publicly available files (see the top exhibit on page 2).

The CMS Medicare data files capture all of the claims for traditional Medicare beneficiaries for the calendar year of the file. Each of these files has a beneficiary identification code that enables tracking

Total Payments by MS-DRG/Procedure/Discharge Status

	MS-DRG 469			MS-DRG 470		
Discharge site	Partial Hip	Total Hip	Total Knee	Partial Hip	Total Hip	Total Knee
Home health	$39,260	$37,559	$32,257	$26,277	$21,621	$22,075
Inpatient	$69,016	$68,030	$64,820	$50,064	$41,020	$35,834
Other	$36,055	$34,658	$34,724	$35,058	$20,695	$20,966
Skilled nursing facility	$56,255	$47,395	$40,888	$42,463	$32,454	$29,891

Source: Cleverley and Associates. Used with permission.

Patients transferred to other facilities had higher costs than those sent home or to home health.

claims filed for the patient during the year. To capture claims experience for MS-DRG 469 and MS-DRG 470, we isolated claims where the discharge occurred during the first nine months of the year, so that any follow-up claims in the remaining 90 days of the year would be captured. However, the last two files referenced—Carrier and Durable Medical Equipment— are 5 percent sample files, limiting the analysis of those files to available claims data.

Analyzing the Data

Our first step in the analysis was to identify all MS-DRG 469 and 470 cases that were discharges during the first nine months of 2013. Those patients were then linked via their beneficiary identification code to all claims filed by other providers that were related to that episode of care. Total payments for treatment by all providers of care during the 90 days following the initial hospital discharge were then accumulated.

We found a large variance between the total payments for MS-DRG 469 and for MS-DRG 470 (see the bottom exhibit on page 2). Average payment for an MS-DRG 469 patient was $50,370, compared to $27,763 for an MS-DRG 470 patient. All provider cost categories are higher, but the dollar variance is especially large in the original inpatient admission and the subsequent related admission. This makes sense because the case weight for an MS-DRG 469 is about 60 percent greater and the likelihood of a related subsequent readmission is higher.

The next step in the analysis was to assess whether there were variations in payments by procedure type. The majority of procedures were categorized as partial hip, total hip, and total knee (see the top exhibit on page 3). Partial hip procedures are the most expensive for both MS-DRG 470 and 469. Broken and fractured hips—traumatic hip injury—are the primary reason for partial hip replacement, while total hip replacements usually result from degenerative arthritis.

The last area reviewed was discharge status (see the bottom exhibit on page 3). The data show that patients transferred to another inpatient facility, including long-term acute care hospitals, have the highest level of total payments. Payments associated with discharge status to either "other" (which most often indicates the patient was sent home) or home health are the lowest.

Understanding Cost Drivers

Bundled payment arrangements represent a shift in risk to healthcare providers, so they must understand the cost drivers. If they can control the cost drivers, they have better control over the economics of the procedure. Big data can play a role in that understanding.

In the case of joint replacements, analyzing big data revealed substantial cost variations associated with the primary procedure and discharge status. Patients discharged to a skilled nursing facility (SNF) or another inpatient facility had much higher costs than those discharged home or to a home health agency. There is also a clear correlation with partial hip procedures and discharge to SNF status. Sixty-four percent of all partial hip procedures were discharged to an SNF compared to 31 percent for total hip and total knee procedures. There are most likely other factors that will influence the episodic costs of MS-DRG 469 and 470 cases that were not discovered in our initial review of the claims data.

Ultimately, providers face two questions. First, do we fully understand what factors drive total episodic cost? Second, are these key cost drivers controllable? If the factors cannot be controlled, then the provider must either exit that product line or be prepared to subsidize losses from other profit-making lines, which are becoming harder to come by.

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