

WORKING P A P E R

Payment for Hardware Used in Complex Spinal Procedures under California's Official Medical Fee Schedule for Injured Workers

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PREFACE

This study updates analyses from a 2003 RAND report¹ examining Official Medical Fee Schedule (OMFS) payments for workers' compensation spinal surgery discharges from acute care hospitals. The OMFS maximum allowable fees for inpatient hospital care are based on 120 percent of the amount that would be payable under the Medicare prospective payment system for inpatient services. In addition, separate payment is made for hardware and instrumentation used during complex spinal surgeries. The 2003 RAND report concluded that the fees should be adequate without the additional payment. Senate Bill 228 (Alarcon, 2003) provides for the additional payments only until the Administrative Director (AD) of the Division of Workers' Compensation (DWC) adopts a regulation specifying separate reimbursement, if any, for the hardware and instrumentation.

The work presented here was performed for the Commission on Health and Safety and Workers' Compensation and the Division of Workers' Compensation, California Department of Industrial Relations under Task 4 of Contract Number 40336045. It is part of a broader study that examines the cost and quality issues affecting medical care provided to injured workers in California, and assesses strategies to improve the quality and efficiency of that care. The findings for the other study tasks will be reported in separate documents.

¹ Barbara O. Wynn, Adopting Medicare Fee Schedules: Considerations for the California Workers' Compensation Program, Santa Monica, CA: RAND, MR-1776-ICJ, 2003.

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SUMMARY

BACKGROUND

The Official Medical Fee Schedule (OMFS) for hospital inpatient services is adapted from the Medicare payment system for inpatient services furnished by acute care hospitals. A pre-determined maximum allowable fee is established for each admission based on the diagnosis-related group- or DRG- to which the patient is assigned. The DRG assignment takes into account factors such as the patient's principal diagnosis, co-morbidities, and surgical procedures. Each DRG has a relative weight reflecting the average resources or costs required by patients assigned to the DRG relative to patients in other DRGs.

The OMFS standard allowance for a discharge is determined as the composite rate² x DRG relative weight x 1.20. Additional allowances are made for discharges with atypically high costs, or outliers. The additional allowance for an outlier case equals 80 percent of the difference between the estimated costs for the discharge and the standard payment for the DRG plus an outlier threshold. In addition, the OMFS allows a separate payment for hardware and instrumentation used in complex spinal surgeries. The separate payment was originally established administratively with respect to all back and spinal procedures. Senate Bill 228 (Alarcon, 2003) limited the pass-through to complex spinal procedures and only until the Administrative Director (AD) of the Division of Workers' Compensation (DWC) adopts a regulation specifying separate reimbursement, if any, for the hardware and instrumentation.

This study updates analyses from a 2003 RAND report³ examining OMFS allowances for workers' compensation spinal surgery discharges from acute care hospitals. The earlier report concluded that the OMFS allowances were resulting in payment for the hardware and instrumentation twice: once in the standard DRG allowance and again in the separate pass-through amount. The report concluded that the standard allowance should be sufficient and that the pass-through was unnecessary.

The purpose of this study is to:

- provide information concerning the hardware and instrumentation that is used in connection with spinal surgery,
- analyze the adequacy of the standard allowance for complex spinal surgeries, and
- discuss options that the AD may wish to consider in adopting a regulation establishing the maximum allowable fee, if any, for the hardware and instrumentation furnished in connection with complex spinal surgeries.

² The composite rate is a hospital-specific rate based on the Medicare standard payment rate adjusted for geographic differences in wages and, if applicable, the hospital's additional payments for teaching and serving a disproportionate share of low-income patients.

³ Barbara O. Wynn, *Adopting Medicare Fee Schedules: Considerations for the California Workers' Compensation Program*, Santa Monica, CA: RAND, MR-1776-ICJ, 2003.

DATA AND METHODOLOGY

We used 2003 administrative and financial data from the California Office of Statewide Health Planning and Development to compare the estimated costs per spinal surgery discharge for CA workers' compensation patients and Medicare patients. Conceptually, if the estimated costs for the workers' compensation patients are less than 120 percent of the costs for Medicare patients, the OMFS allowances for spinal surgery discharges should be sufficient without the pass-through allowance for hardware and instrumentation. The 20 percent reflects the 1.20 multiplier that is intended to compensate for any higher costs that workers' compensation patients might incur and to provide a reasonable margin on treating injured workers.

Another aspect of our study was to simulate what payments would have been under the OMFS if the Medicare-based fee schedule had applied in 2003 and to compare the simulated payments to estimated costs. To estimate costs, we applied an overall cost-to-charge ratio to the total charges in the administrative data for each workers' compensation complex spinal surgery case. In theory, a hospital's charges should be consistently related to its costs. An overall cost-to-charge ratio reflects the hospital's average markup across all services, but there can be substantial differences in hospital markups for particular types of services. We are limited to using an overall cost-to-charge ratio for this analysis and do not have the detailed charge information needed to know how a particular hospital's average markup (or cost-to-charge ratio) for spinal surgery discharges compares with its markup for other services.

Finally, we looked at usage rates across patient populations and hospitals for four selected products used during spinal surgery that we are able to identify by procedure code: interbody cages, bone morphogenic proteins, bone growth stimulators, and neurostimulators for pain.

FINDINGS

Our comparative analysis of Medicare and workers' compensation spinal surgery discharges shows that on average workers' compensation patients are less costly than Medicare patients and have a shorter length of stay. The DRG-mix adjusted Medicare cost per discharge is about 14% higher than the cost per discharge for workers' compensation patient.

The payment simulation suggests that 1.20 times the Medicare rates had been used to pay for spinal surgery discharges in 2003, total OMFS payments would have exceeded estimated costs. The estimated payment-to-cost ratio across all DRGs was 1.43 and was higher (1.51) when no hardware was inserted than when it was used (1.33). We also looked at the payment-to-cost ratios by type of hardware to see whether the use of a particular device had a substantially different effect on the payment-to-cost ratio for workers' compensation patients and found that while there are differences across the products, the average payment-to-cost ratio for each type of hardware was 1.09 or higher. Finally, when we looked at usage of hardware across patient populations and hospitals, we found that the usage rates for workers' compensation patients are considerably higher than for Medicare patients for some but not all DRGs. We also found substantial variation in the usage rates for workers' compensation patients. Four hospitals used hardware 75 percent more often than would be expected based on the overall usage rates for workers' compensation patients with the same DRG mix. Even though these hospitals are reporting considerably more hardware usage than other hospitals, their average payment-to-cost

ratio is comparable to the discharge-weighted average across all hospitals with at least 20 workers' compensation spinal surgeries.

DISCUSSION OF FINDINGS AND POLICY OPTIONS

Under current policies, the OMFS allowances for spinal surgeries essentially pay for the hardware used in spinal procedures twice: once through the DRG payment and again in the pass-through payment. Moreover, the cost-based payment plus handling provides no incentive for prudent purchasing and use of hardware. Also, there is considerable administrative burden involved in establishing the appropriate pass-through amount through pricing each claim individually.

The data analyzed in this study do not support a continuation of the pass-through. The comparison of Medicare and workers' compensation discharges shows that on average injured workers are less costly than Medicare patients and have a shorter length of stay. Although more hardware is used for workers' compensation patients in certain DRGs than for Medicare patients, the shorter length of stay generally offsets the added costs. The comparison suggests that the 1.20 multiplier to the Medicare payment rate should be sufficient to assure that OMFS payments on average for complex spinal surgeries are more than the cost of providing care. This does not mean that the payment for every workers' compensation discharge will be higher than the costs for that patient. The DRG system is built on a system of averages, where some discharges are more costly than others, and the goal is to assure that on average the payment is adequate.

The results of the payment simulation are based on an overall cost-to-charge ratio and should be interpreted with some caution since hospital markups may differ for spinal surgeries. Not unexpectedly, the results indicate payment-to-cost ratios are lower when expensive hardware is used than when it is not. However, even when hardware is used, the payment-to-cost ratios are on average above 1.20 for most spinal surgery DRGs. The 1.20 is comparable to the average ratio for private payors.⁴ Moreover, hospitals that use substantially more hardware than other hospitals still have payment-to-cost ratios that are comparable to the overall average for workers' compensation patients. While the payment simulation results are not definitive given the limitations of the methodology, they lend further support to the conclusion that a pass-through is unnecessary to assure payments are adequate for workers' compensation spinal surgeries.

The OMFS has adopted Medicare's temporary add-on for quality-enhancing costly hardware that is intended to assure that FDA-approved high-cost quality-enhancing new technology is recognized before the higher costs are reflected in the charge data used to establish the DRG relative weights. If desired, a higher percentage of the estimated cost could be paid for technology qualifying for the add-on payment. After the expiration of the temporary add-on payment, the high cost outlier policy provides some protection for hospitals that have a disproportionate share of procedures using high-cost technology.

Any special payment policy for hardware and instrumentation should be evaluated for its likely impact on financial incentives for appropriate utilization of these products during spinal surgery and on administrative burden. There is no support in the data for continuing to pay for

⁴ Medicare Payment Advisory Commission, *Report to the Congress: Medicare Payment Policy*, March 2005.

relatively inexpensive hardware and instrumentation that is used during spinal surgical procedures. If there is a continuing concern that the payment-to-cost ratios are lower when costly hardware is used than when it is not, alternatives to the current pass-through could be considered. For example, the multiplier could be reduced for most spinal surgery discharges and increased when specific high cost technology is used, such as those examined in this study. This approach would minimize administrative burden by keeping any additional payment within the DRG per discharge payment and would eliminate the duplicate payment. While it retains an incentive to use hardware and instrumentation during spinal surgery, this alternative creates an incentive to use less costly instead of more costly products of comparable quality. Establishing a separate fee schedule for the individual products that would be eligible for special payment would improve payment accuracy but would also add the administrative burden of maintaining the fee schedule and pricing the claims.

ACKNOWLEDGEMENTS

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INTRODUCTION

PURPOSE OF THE STUDY

The Official Medical Fee Schedule (OMFS) for hospital inpatient services allows a pass-through for hardware and instrumentation used in complex spinal surgeries. The pass-through policy was originally established administratively with respect to all back and spinal procedures. Senate Bill 228 (Alarcon, 2003) limits the pass-through to complex spinal procedures and only until the Administrative Director (AD) of the Division of Workers' Compensation (DWC) adopts a regulation specifying separate reimbursement, if any, for the hardware and instrumentation.

The purpose of this study is to:

- provide information concerning the hardware and instrumentation that is used in connection with spinal surgery,
- analyze the adequacy of the standard allowance for complex spinal surgeries, and
- discuss options that the AD may wish to consider in adopting a regulation establishing the maximum allowable fee, if any, for the hardware and instrumentation furnished in connection with complex spinal surgeries.

BACKGROUND

OMFS Fee Schedule Allowances for Complex Spinal Surgeries

The OMFS inpatient fee schedule is adapted from the Medicare payment system for inpatient services furnished by acute care hospitals. A pre-determined maximum allowable fee is established for each admission based on the diagnosis-related group- or DRG- to which the patient is assigned. The DRG assignment takes into account factors such as the patient's principal diagnosis, co-morbidities, and surgical procedures. Each DRG has a relative weight reflecting the average resources or costs required by patients assigned to the DRG relative to patients in other DRGs. The relative weight is used in the fee schedule to account for differences in case mix. In addition, adjustments are made in the allowance to take into account hospital characteristics such as geographic location and area wage differentials, involvement in medical education, and commitment to serving low-income patients.

The OMFS standard allowance for a discharge is determined as the composite rate⁵ x DRG relative weight x 1.20. Additional allowances are made for discharges with atypically high costs, or outliers. The additional allowance for an outlier case equals 80 percent of the difference between the estimated costs for the discharge and the standard payment for the DRG plus an outlier threshold. In addition to the pre-determined per discharge payment, implantable hardware and/or instrumentation for complex spinal procedures are reimbursed separately at the hospital's documented costs plus 10 percent (up to \$250) and any shipping and handling charges. Medicare includes these costs in its standard payment rate for spinal surgery discharges.

⁵ The composite rate is a hospital-specific rate based on the Medicare standard payment rate adjusted for geographic differences in wages and, if applicable, the hospital's additional allowances for teaching and serving a disproportionate share of low-income patients.

When SB 228 was enacted, complex spinal surgeries were defined as DRGs 4, 496–498, 511 and 512. DRG 4 has since been split into two new DRGs: DRG 531 Spinal Procedures with Complications and Co-morbidities (CCs) and DRG 532 Spinal Procedures without CCs. The complex spinal surgery DRGs for federal fiscal year (FY) 2003 and FY05 are listed in Table 1 together with their respective relative weights. (The FY03 rates are applicable to the most recent available data on workers' compensation inpatient stays and the FY05 rates are in use in 2005.) The relative weights are based on national Medicare administrative data and are recalibrated annually. The FY05 relative weights indicate the most resource intensive spinal surgery DRG (DRG 496 Combined Anterior/Posterior Spinal Fusion) is nearly four times more costly than the least resource-intensive DRG (DRG 523 Spinal Procedures without CCs).

Table 1
Complex Spinal Surgery DRGs: Relative Weights for FY2003 and FY2005

DRG	Description	FY 2003	FY 2005
		Relative Weight	Relative Weight
4	Spinal procedures	2.318	---
496	Combined anterior/posterior spinal fusion	5.799	5.807
497	Spinal fusion except cervical with CCs	3.394	3.525
498	Spinal fusion except cervical without CCs	2.474	2.653
519	Cervical spinal fusion with CCs	2.355	2.415
520	Cervical spinal fusion	1.539	1.630
531	Spinal procedures with CCs	---	3.098
532	Spinal procedures without CCs	---	1.468

An earlier RAND report examined the adequacy of a Medicare-based fee schedule payment for spinal surgery discharges using 2000 OSHPD data and Medicare payment rates for 2000 (Wynn, 2003). The average payment was higher than the estimated average cost for every DRG. Across all DRGs for spinal surgeries, the aggregate payment-to-cost ratio was 1.15 *before* application of the 1.20 multiplier. In other words, if OMFS payments had been based on the current Medicare rates and DRGs in 2000, the study estimated aggregate payments would have been 15 percent higher than estimated costs before the 1.20 multiplier was applied and the additional pass-through payments were made for hardware and instrumentation.

Implantable Hardware and Instrumentation

Implantable products used in spinal fusions fall into four main categories:

1. Fixation hardware is used to immobilize a section of the spine while it fuses. There are two main types of fixation hardware: rods used in conjunction with pedicle screws and interbody cages. The newer and more expensive technology involves interbody cages.

2. Osteoconductive implants provide the scaffolding required for new bone growth. This need can be met with a bone graft. There are also a large number of different products on the market that can provide the necessary scaffolding and eliminate the need for bone grafts.
3. Materials and devices promote bone growth through either electrical stimulation or their inclusion of bone morphogenic proteins (BMPs). These proteins are sometimes introduced through autologous bone, malleable putties made out of bone that has had its calcium removed, or collagen-based sponges. In addition to BMPs, implantable electrical stimulators are recommended for patients who may have difficulty with the bone healing process.
4. Implantable electrical neurostimulators are used to reduce pain.

Some of the newer technologies are identifiable in the administrative data using ICD–9–CM procedure codes, including use of interbody cages (84.51), insertion of BMP (84.52), insertion of bone growth stimulators (78.9) and neurostimulators for pain (3.93). These technologies are described more fully in Appendix A.

TEMPORARY MEDICARE ADD-ON PAYMENTS FOR NEW TECHNOLOGY

In addition to the pass-through payments for hardware and instrumentation, the OMFS includes the Medicare add-on payment for new technology. The add-on applies if the new technology costs are not reflected in the data used to establish the DRG relative weights and the estimated costs for patients receiving the new technology show the DRG payment is inadequate.⁶ The additional payment is made for two to three years until the administrative data with the new ICD–9–CM code can be evaluated and reflected in the DRG relative weights.

The actual add-on payment for a qualifying new technology is made on a case-by-case basis. If the cost of a particular new technology case exceeds the DRG payment amount, Medicare pays 50 percent of the excess cost (not to exceed 50 percent of the estimated cost of the new technology).⁷ The formula is as follows:

Add-on payment_{ind} = lesser of: 0.50 X (Estimated cost_{ind} – (DRG payment_{ind}) or maximum add-on amount for new technology

The differences between the Medicare add-on payment and the OMFS pass-through are that (1) clinical criteria are used to determine whether the device is eligible for a pass-through, (2) payment is made only if the DRG payment is otherwise insufficient, and (3) the full cost of the device is not passed through, thereby providing a stronger incentive to avoid unnecessary utilization. A fuller explanation of the add-on for new technology is in Appendix B.

DATA AND METHODS

We used 2003 administrative data from the California Office of Statewide Planning and Development (OSHPD), which is the most recent available data, to compare the estimated costs per

⁶ Section 1886(d)(5)(k) of the Social Security Act as amended by Section 533 of the Benefits Improvement and Protection Act of 2000 (Public Law 106-554) and Section 503(b)(1) of the Medicare Prescription Drug, Improvement and Modernization Act (Public Law 108-173).

⁷ The same cost-to-charge ratio that is used to determine outlier payments is used to determine the estimated case cost. The higher payment amount is treated as the base payment in determining outlier payments.

discharge for CA workers' compensation patients and Medicare patients. Conceptually, if the estimated costs for the workers' compensation patients are no more than 20 percent higher than the costs for Medicare patients, the OMFS payments for spinal surgeries should be sufficient without an additional pass-through for hardware and instrumentation. The 20 percent reflects the 1.20 multiplier that is intended to compensate for any higher costs that workers' compensation patients might incur and to provide a reasonable margin on treating injured workers.

We used the 2003 OSHPD data to 1) determine the volume of discharges in each spinal surgery DRG for Medicare and workers' compensation patients, 2) compare by DRG the average length of stay and average charges for Medicare and workers' compensation patients and 3) compare the overall average cost per discharge for workers' compensation patients to the overall average for Medicare patients assuming the same distribution of discharges across the DRGs for spinal surgery. To estimate the costs for each stay, we applied a hospital-specific cost-to-charge ratio to the total charges reported for the stay.

In addition to knowing how workers' compensation patients compare to Medicare patients, we wanted to know how payments based on the OMFS allowances compare on average to the estimated costs for workers' compensation patients assigned to the spinal surgery DRGs, whether the average payment-to-cost ratios vary according to the use of hardware during spinal surgery, and how hardware usage varies across hospitals. To address these questions, we simulated what workers' compensation payments would have been in 2003 if payment had been based on 1.2 x the Medicare payment rates in effect during 2003. We computed a payment-to-cost ratio for each discharge by dividing the simulated payment amount by the estimated cost. We categorized each discharge by its usage of hardware and instrumentation reported in the administrative data using the following procedure codes:

- Interbody cages (84.51)
- Insertion of BMP (84.52)
- Insertion of bone growth stimulators (78.9)
- Insertion of neurostimulators for pain (3.93).

The current pass-through applies to any hardware or instrumentation used during spinal surgery. We cannot identify routine items because a specific procedure code has not been established for these items. Our assumption is that an analysis of the comparative usage rates and payment-to-cost ratios for the identified procedures will be indicative of whether alternative payment policies should be considered. When we report hospital-level data on hardware usage, we include only those hospitals that performed at least 20 spinal surgeries on workers' compensation inpatients. A more detailed explanation of the methodology is in Appendix C.

Hospital charging practices affect the accuracy of the cost estimate. First, hospitals have different charge structures for the services they provide and there are limitations on the extent to which this can be taken into account. In theory, a hospital's charges should be consistently related to its costs. An overall cost-to-charge ratio reflects the hospital's average markup across all services, but there can be substantial differences in hospital markups for particular types of services. Generally, the markup is higher for ancillary services and devices than for inpatient "room and board" services and for high cost stays (e.g., orthopedic surgical procedures) than for lower cost stays. We are limited to using an overall cost-to-charge ratio for this analysis and do not have the detailed charge information needed to know how a particular hospital's average markup (or cost-to-charge ratio) for spinal surgery discharges compares with

that for other services.⁸ The limitations of the cost-to-charge ratio are less important in a comparison of costs per discharge for workers' compensation patients and Medicare patients (since relative costliness is being examined) than in comparing how OMFS payment allowances compare to estimated costs for injured workers assigned to the DRGs for spinal surgery.

FINDINGS

Comparison of Medicare and Workers' Compensation Discharges

Table 2 summarizes our findings by DRG and by payor with respect to the number and distribution of discharges, the average length of stay, the average charges per stay and the average estimated cost per stay. In total, there were 5,825 workers' compensation discharges assigned to the spinal surgery DRGs compared to 5,436 for Medicare beneficiaries.

Table 2
Comparison of Workers' Compensation and Medicare Patients in Spinal Surgery DRGs in 2003 OSHPD Administrative Data

DRG	Number and Distribution of Discharges				Average Length of Stay in Days		Average Charges Per Discharge		Estimated Average Cost Per Discharge	
	WC		Medicare		WC	Medicare	WC	Medicare	WC	Medicare
	No.	(%)	No.	(%)			(\$)	(\$)	(\$)	(\$)
4	308	5.3	609	11.2	4.7	7.2	55,943	71,803	13,732	17,599
496	931	16.0	409	7.5	5.7	8.8	121,922	158,855	29,059	39,719
497	940	16.1	1,846	34.0	5.4	6.3	101,371	97,772	24,234	24,586
498	2,082	35.7	1,348	24.8	3.8	2.5	77,261	28,349	19,374	17,068
519	239	4.1	499	9.2	3.0	5.1	55,022	68,334	13,343	17,333
520	1,325	22.7	725	13.3	2.1	2.3	45,640	45,527	11,406	11,373
ALL	5,825	100	5,436	100	4.0	5.0	79,057	72,573	19,348	20,650

Figure 1 depicts the distribution of discharges across the DRGs for spinal surgery graphically. The distribution of discharges is quite different for the two populations with a higher percentage of Medicare patients within a paired DRG set (two DRGs that differ only on the presence or absence of complications or co-morbidities (CCs)) being assigned to the DRG with CCs:

- DRG 498 Spinal Fusion except Cervical without CC accounts for 36 % of workers' compensation discharges compared to less than 25 % of Medicare discharges while DRG 497 Spinal Fusion except Cervical with CC accounts for 16 % and 34 % of workers' compensation and Medicare discharges, respectively.

⁸ The Medicare cost report has charges and costs by hospital department. If charges by department were available, one could determine the estimated cost per discharge by applying the departmental cost-to-charge ratio to the departmental charges. The OSHPD administrative data have only total charges and further investigation of this issue is beyond the scope of this study.

- DRG 520 Cervical Spinal Fusion without CC accounts for 23% of workers' compensation spinal surgery discharges and 13% of Medicare discharges while DRG 519 Cervical Spinal Fusion with CC accounts for 4 % and 9 % of workers' compensation and Medicare discharges, respectively.

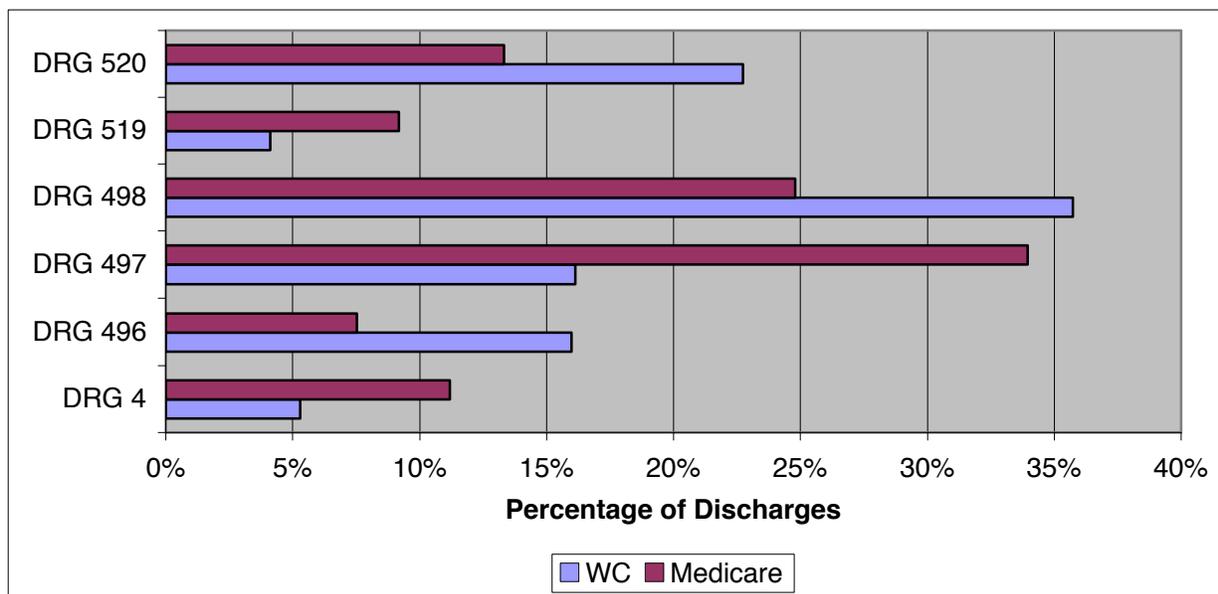


Figure 1—Distribution of Discharges Across DRGs for Spinal Surgery 2003 OSHPD Data

The most resource intensive spinal fusion DRG is DRG 496 Combined Anterior/Posterior Spinal Fusion. Sixteen percent of workers' compensation discharges and 8 % of Medicare discharges are assigned to this DRG.⁹

Figure 2 compares the estimated average cost per discharge by DRG and by payor. Workers' compensation patients assigned to DRG 498, the highest volume spinal surgery DRG for workers' compensation patients, on average are about 13.5% more costly than Medicare patients despite have about the same average length of stay. Medicare patients are substantially more costly than workers' compensation patients in DRG 496 and somewhat more costly in DRGs 4 and 519. The costs for workers' compensation and Medicare patients in DRG 520 are about the same.

The Medicare payment system works on a system of averages, so that some discharges are paid more than cost and others are paid less than cost. The most important question is not how the costs for a particular DRG compare, but whether workers' compensation discharges on average across all the spinal surgery DRGs are more or less costly than Medicare patients after standardizing for differences in the distribution of discharges across the spinal surgery DRGs. Figure 3 summarizes the overall cost relationship. The workers' compensation estimated average cost is a discharge-weighted average for all workers' compensation discharges. The Medicare estimated cost per case was computed by weighting the

⁹ In FY05, Medicare changed the DRG logic so that 360-degree spinal fusions, which are less costly than other combined anterior/posterior spinal fusions, are now assigned to DRGs 497 and DRG 498. Of the discharges assigned to DRG 496 in the 2003 claims data, 6 % of the workers' compensation discharges and 15 percent of the Medicare discharges would have been assigned to DRG 497/498 under the FY05 classification rules.

estimated average Medicare cost per discharge for each DRG by the number of workers' compensation discharges assigned to the DRG. Thus, the graph shows the relationship between the estimated average cost for workers' compensation discharges and what the estimated average cost would have been for Medicare patients if the discharge distribution had been the same. The estimated average cost per discharge for workers' compensation discharges was \$19,348. If the Medicare discharges had been similarly distributed across the spinal surgery DRGs, the average cost per Medicare discharge would have been \$22,122, or 14 % higher. In short, the data indicate that on average Medicare spinal surgery cases are more expensive than workers' compensation cases, and that the OMFS 1.20 multiplier should be sufficient to assure OMFS payments are on average adequate for spinal surgeries.

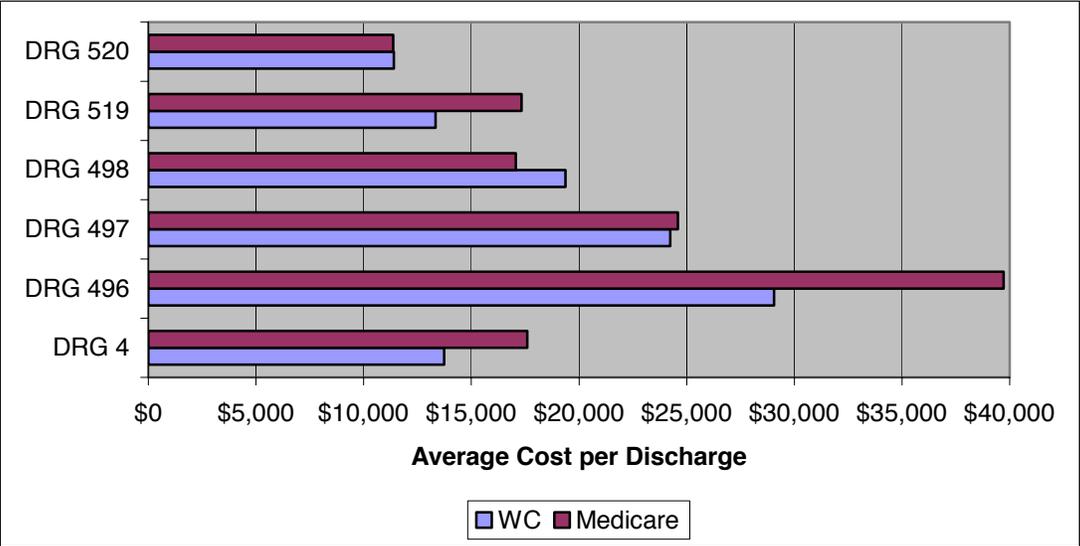


Figure 2—Comparison of Estimated Average Costs Per Discharge for Workers' Compensation and Medicare Spinal Surgery Discharges in 2003

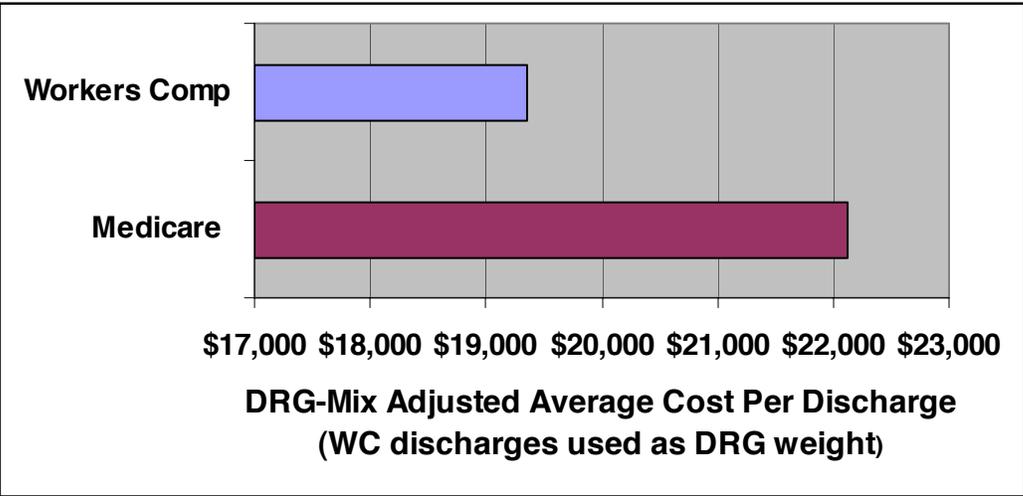


Figure 3—Comparison of Estimated DRG-Mix Adjusted Average Cost Per Discharge for Workers' Compensation and Medicare Spinal Surgery Discharges in 2003

Estimated Payment-to-Cost Ratios

Our payment simulation compared the FY2003 payments with estimated average costs for workers' compensation patients in 2003. The results are summarized in Figure 4 by DRG according to hardware usage. The estimated payment-to-cost ratio across all DRGs was 1.43 and was higher (1.51) when no hardware was inserted than when it was inserted (1.33). This pattern was consistent across DRGs 4, DRG 496, DRG 497 and DRG 498. With the exception of DRG 498 Spinal Fusion except Cervical Without CCs, the payment-to-cost ratio for these DRGs when hardware was used was still above 1.20. The payment-to-cost ratio for DRG 498 with hardware was 1.09. The pattern for DRGs 519 and 520 (Cervical Spinal Fusion with CCs and without CCs) is different: the payment-to-cost ratio for DRG 519 is not affected by the use of hardware and is actually higher for DRG 520 when hardware is used. This same pattern was not evident for Medicare patients assigned to DRGs 519 and 520 (that is, consistent with the other spinal surgery DRGs, the payment-to-cost ratio for Medicare patients was lower when hardware was used).

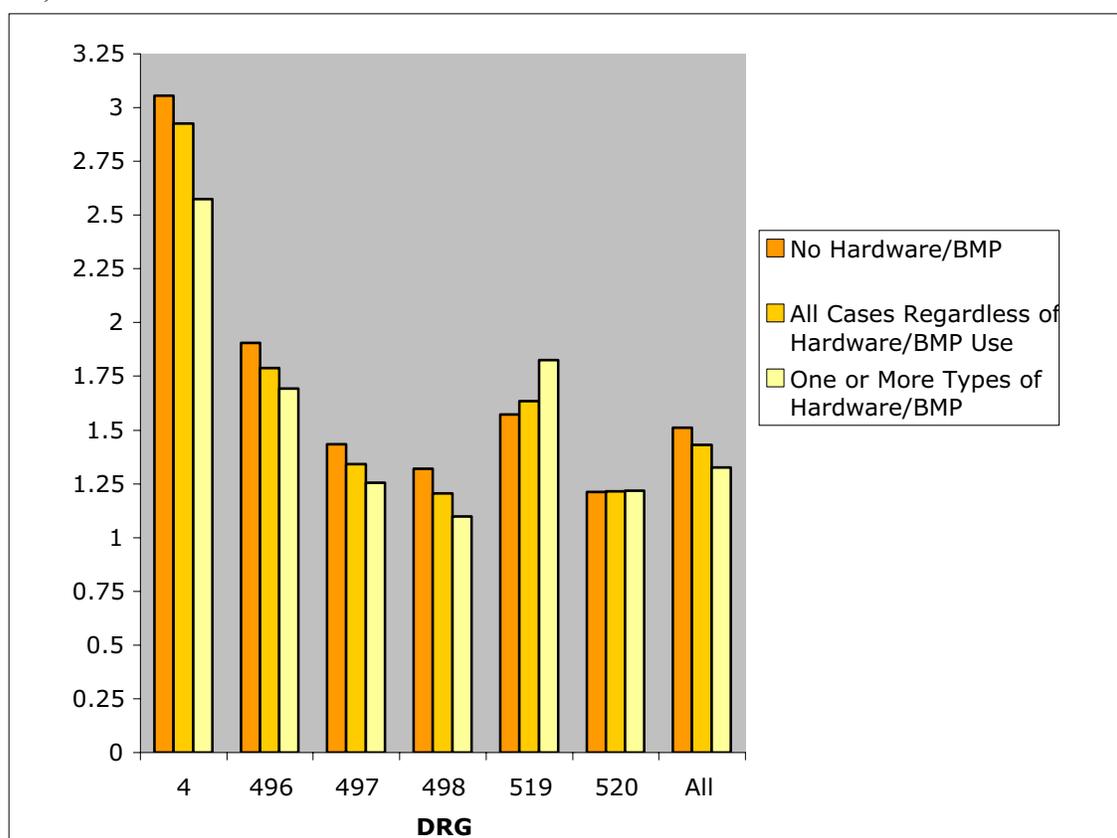


Figure 4—Payment-to-Cost Ratios for Workers' Compensation Discharges in 2003 by DRG and Use of Hardware

There was considerable range in the payment-to-cost ratios by DRG. The payment-to-cost ratio was much higher for DRG 4 Spinal Procedures (2.92) than for the spinal fusion DRGs. This DRG has been replaced by separate DRGs for discharges with CCs (DRG 531) and discharges without CCs (DRG 532). Based on the distribution of workers' compensation patients in the spinal fusion DRGs, we assume that most injured workers will be assigned to the less resource-intensive DRG and that the payment-to-cost ratio will be lower for spinal procedures under the refined DRGs.

We also looked at the payment-to-cost ratios by type of hardware to see whether the use of a particular device had a substantially different effect on the payment-to-cost ratio for workers' compensation patients (Figure 5). The average payment-to-cost ratio for each type of hardware is above 1.09 (BMP only) and is as high as 2.80 (neurostimulator only). Most workers' compensation patients receiving neurostimulators are assigned to DRG 4, which as seen in Figure 4 has an atypically high payment-to-cost ratio. The only payment-to-cost ratio that is below 1.0 is for a subset of workers' compensation patients who received bone growth stimulator, an interbody cage and BMP. There were only 7 patients in this category, or .1 % of all spinal surgery cases.

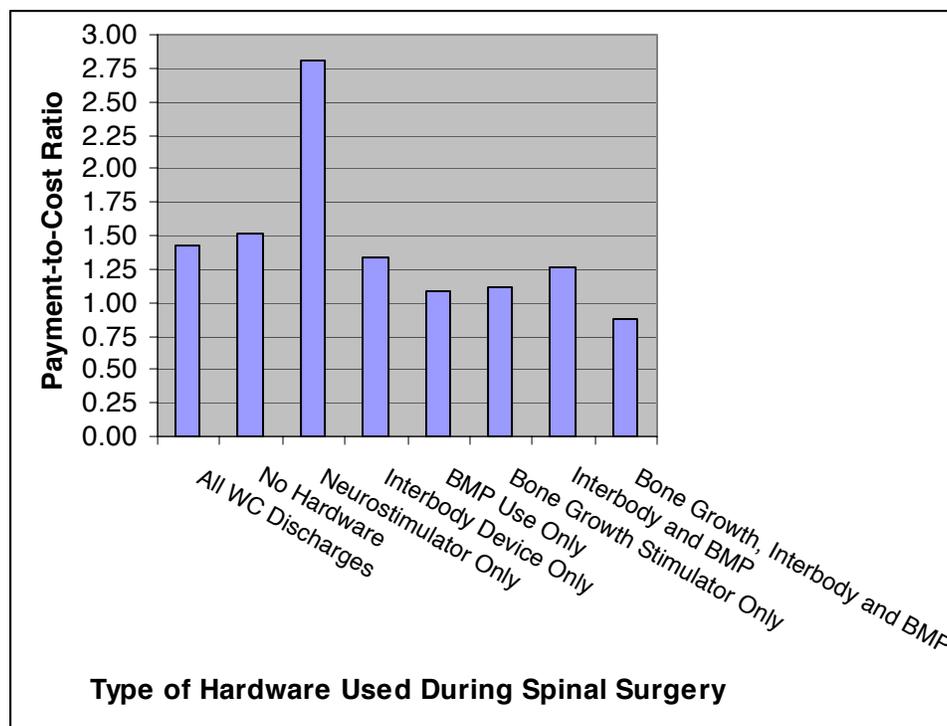


Figure 5—Payment-to-Cost Ratios for Workers' Compensation Discharges in 2003 by Type of Hardware Used During Spinal Surgery Hardware Usage by Payor

One rationale given for the hardware pass-through is that more hardware is used for workers' compensation patients than for Medicare patients. We used the ICD-9-CM procedure codes to examine usage of the most expensive hardware by payor. Figure 6 shows the overall usage of hardware by DRG. Approximately the same proportion of workers' compensation patients and Medicare patients receive one or more types of hardware in three DRGs. For DRG 4, the usage rate for injured workers (27%) is twice the rate for Medicare patients (13%). For DRGs 497 and 498 (Spinal Fusion except Cervical with CCs and without CCs), about 50% of injured workers receive one or more types of hardware compared to about 30% of Medicare patients.

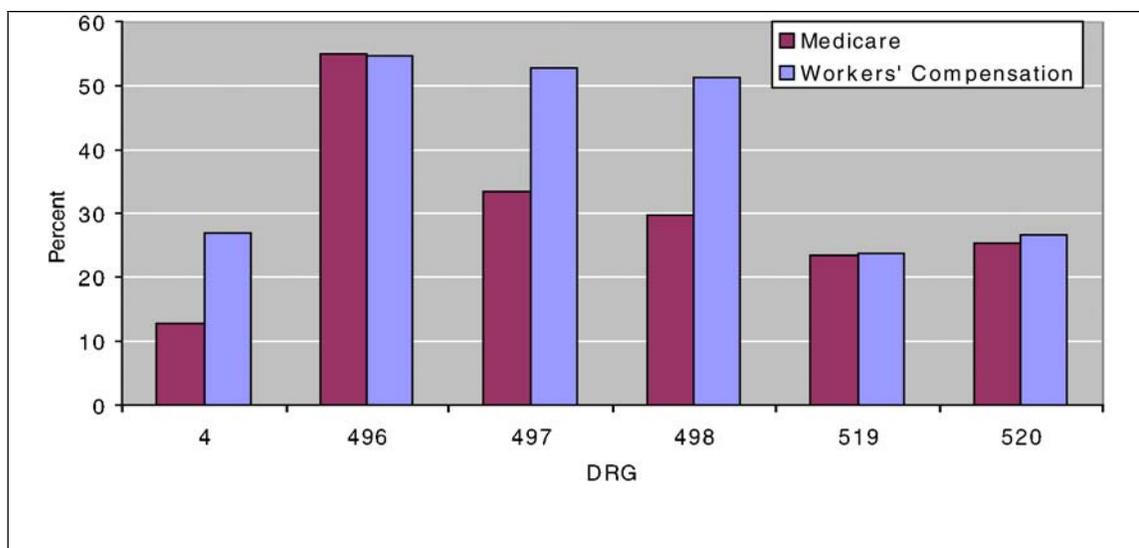


Figure 6—Percentage of Discharges With One or More Insertions of Hardware or BMP in 2003 by DRG and Payor

The pattern of hardware usage across hospitals has relevance in deciding whether the payment for hardware and instrumentation should be folded into the standard OMFS allowance or whether a separate allowance for hardware and instrumentation might be appropriate. The DRG relative weight reflects average hardware usage. If the pattern is similar across hospitals, a separate payment is unnecessary. A hospital with typical hardware usage would be overpaid on some cases and underpaid on others but on average the payment would generally account for the hardware used during spinal surgeries at the hospital. If there is substantial variation in usage, a separate allowance might be appropriate to avoid overpaying hospitals with relatively low usage rates and underpaying hospitals with relatively high usage rates (assuming the higher usage is medically appropriate). For each hospital, we determined by DRG the actual usage rate and an expected usage rate based on the average hardware usage for workers' compensation patients assigned to each DRG. We then computed an overall ratio of actual to expected usage for those hospitals with at least 20 workers' compensation spinal surgery discharges. There were 93 of these hospitals. The results by hospital are summarized in Figure 7. A hospital with a ratio of .50 used hardware one-half as often as the DRG-mix adjusted average for workers' compensation patients. A hospital with a ratio of 2.0 uses twice as much hardware relative to the average for workers' compensation patients. The higher rate could be attributable to either using multiple types of hardware during a single surgery more often (e.g., both interbody cage and BMP) or inserting any hardware more frequently. There were two hospitals that reported no hardware usage for workers' compensation spinal surgeries.

Table 3 provides information on number of workers' compensation discharges and payment-to-cost ratios by groupings of hospitals based on their actual to expected usage ratios. There are only four hospitals with an expected-to-actual usage ratio of 1.75 or more. Even though these hospitals are reporting considerably more hardware usage than other hospitals, their average payment-to-cost ratio is comparable to the discharge-weighted average across all hospitals with at least 20 workers' compensation spinal surgeries.

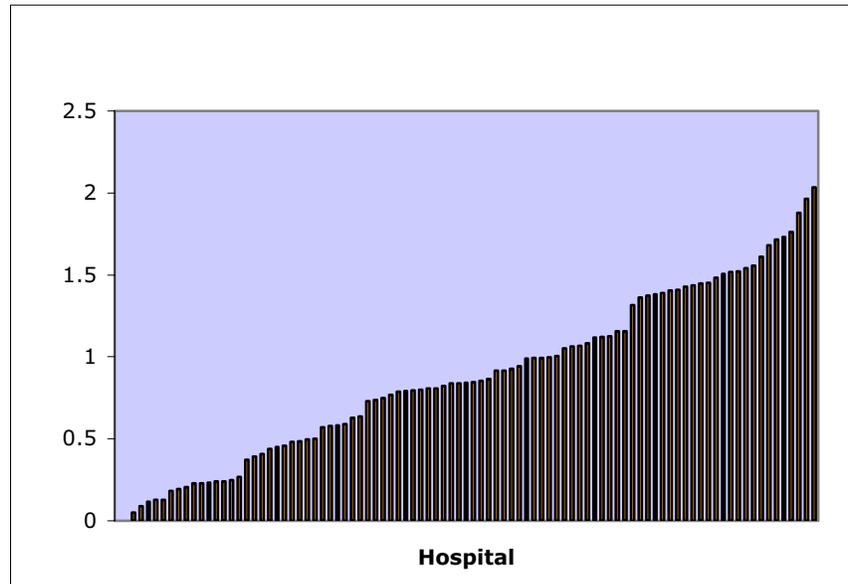


Figure 7—Ratios of Actual Usage of Hardware to Expected Usage Based on DRG Mix for Workers' Compensation Patients in 2003 by Hospital

Table 3

Distribution of Hospitals, Workers Compensation Discharges, and Average Payment-to-Cost Ratios by Ratio of Actual to Expected Hardware Usage for Workers Compensation Patients in 2003

Ratio of Actual-to-Expected Usage	Number of Hospitals	Number of Cases	Average Number of Cases	Average Ratio of Actual to Expected Usage	Average Payment-to-cost Ratio
<.25	14	470	34	0.16	1.78
.25 to <.50	10	478	48	0.37	1.92
.50 to <.75	11	547	50	0.61	1.56
.75 to <1.0	21	991	47	0.85	1.18
1.0 to <1.25	12	1238	103	1.11	1.34
1.25 to <1.50	12	1103	92	1.41	1.24
1.50 to <1.75	9	542	60	1.59	1.62
1.75 and above	4	94	24	1.90	1.41
All Hospitals	93	5463	59	0.99	1.43

Note: Includes only hospitals with at least 20 workers' compensation spinal surgery discharges. Averages are discharge-weighted.

DISCUSSION OF FINDINGS AND POLICY OPTIONS

Under current policies, the OMFS allowances for spinal surgeries essentially pay for the hardware used in spinal procedures twice: once through the DRG payment and again in the pass-through payment. Moreover, the cost-based payment plus handling provides no incentive for prudent purchasing and use of hardware. Also, there is considerable administrative burden involved in establishing the appropriate pass-through amount through pricing of each claim individually.

The data analyzed in this study does not support a continuation of the pass-through. The comparison of Medicare and workers' compensation discharges shows that on average injured workers are less costly than Medicare patients and have a shorter length of stay. The DRG-mix adjusted Medicare cost per discharge is about 14% higher than the cost per discharge for workers' compensation patient. Although more hardware is used for workers' compensation patients in certain DRGs (namely, DRGs 4, 497 and 498) than for Medicare patients, shorter length of stays for workers' compensation patients in these DRGs generally offset the added costs. The comparison suggests that the 1.20 multiplier to the Medicare payment rate should be sufficient to assure that OMFS allowances on average for complex spinal surgeries are substantially more than the cost of providing care. This does not mean that the payment for every workers' compensation discharge will be higher than the costs for that patient. The DRG system is built on a system of averages, where some discharges are more costly than others, and the goal is to assure that on average the payment is adequate.

The results of the payment simulation are based on an overall cost-to-charge ratio and should be interpreted with some caution since hospital markups may differ for spinal surgeries. The likelihood, however, is that the payment-to-cost ratios are understated rather than overstated since hospital markups tend to be relatively high for orthopedic cases. Not unexpectedly, the results indicate payment-to-cost ratios are lower when expensive hardware is used than when it is not. However, even when costly hardware is used, the payment-to-cost ratios on average are above 1.20 for most spinal surgery DRGs. The 1.20 is comparable to the average ratio for private payors.¹⁰ The only exception is DRG 496, where the payment-to-cost ratio is 1.09. Moreover, hospitals that use substantially more hardware than other hospitals still have payment-to-cost ratios that are comparable to the overall average for workers' compensation patients and the concern that these hospitals might be underpaid is not supported by the data. While the payment simulation results are not definitive given the limitations of the methodology, they lend further support to the conclusion that a pass-through is unnecessary to assure payments are adequate for workers' compensation spinal surgeries.

The OMFS has adopted Medicare's temporary add-on for quality-enhancing costly hardware. This provision is intended to assure that FDA-approved high-cost quality-enhancing new technology is recognized before the higher costs are reflected in the charge data used to establish the DRG relative weights. If desired, a higher percentage of the estimated cost could be paid for technology qualifying for the add-on. After the expiration of the add-on payment, the high cost outlier policy provides some protection for hospitals that have a disproportionate share of procedures using high-cost technology.

Any special payment policy for hardware and instrumentation should be evaluated for its likely impact on financial incentives for appropriate utilization of these products during spinal surgery and on administrative burden. There is no support in the data for continuing to pay for relatively inexpensive hardware and instrumentation that is used during spinal surgical procedures. If there is a continuing concern that the payment-to-cost ratios are lower when hardware is used than when it is not, alternatives to the current pass-through could be considered. For example, the multiplier could be reduced for most spinal surgery discharges and increased when specific high cost technology is used, such as those examined in this study. This approach would minimize administrative burden by keeping any additional payment within the DRG per discharge payment and would eliminate the duplicate payment. While it

¹⁰ According to the Medicare Payment Advisory Commission, the private payer payment-to-cost ratio for hospital services was about 1.2 in 2003. MedPAC, *Report to the Congress: Medicare Payment Policy*, March 2005.

retains an incentive to use hardware and instrumentation during spinal surgery, it creates an incentive to use less costly instead of more costly products of comparable quality. Establishing a separate fee schedule for the individual products that would be eligible for special payment would improve payment accuracy but would also add the administrative burden of maintaining the fee schedule and pricing the claims.

APPENDIX A

HARDWARE USED DURING SPINAL SURGERY

Implantable products used in spinal fusions fall into four main categories: (1) fixation hardware used to immobilize a section of the spine while it fuses, (2) osteoconductive implants that provide the scaffolding required for new bone growth, (3) materials and devices that promote bone growth or “osteogenesis” through either electrical stimulation or their inclusion of bone morphogenic proteins (BMPs), and (4) devices meant to reduce pain. Further information on these products is provided below.

I. Fixation Hardware

There are two main types of fixation hardware: rods used in conjunction with pedicle screws and interbody cages. Pedicle screws are placed in two or three consecutive vertebrae and then connected with short rods that prevent motion between the vertebral segments while bone grows between them. After fusion is complete, the rods and screws are no longer necessary and can be removed in a subsequent surgery. Manufacturers of this type of hardware include Blackstone Medical (www.blackstonemedical.com), DePuy Orthopaedics (www.depuyorthopaedics.com), and Spinal Concepts, Inc. (www.spinalconcepts.com). We are assuming that the use of screws and rods is included in the 81.0 ICD–9 code as there is not a separate procedure code for their implantation.¹¹

The newer of the two alternatives, anterior interbody cages, are porous titanium cylinders that are placed in the space between two vertebrae and allow bone to grow through the pores from one vertebra to the next. The cages provide fixation without requiring any additional instrumentation and is a technique that purportedly results in less morbidity than when rods and screws are used. They were approved for use by the FDA in September 1996 and are sold by DePuy Orthopaedics and other manufacturers. The implantation of an interbody device is coded using ICD–9 code 84.51.¹²

II. Osteoconductive Implants

In addition to a means of immobilizing the section of the spine being fused, a scaffolding of some sort on which new bone can grow is also necessary in fusion surgery. This need can be met with two types of bone grafts: allograft bone and autologous bone. Harvested from corpses, allograft bone provides calcium scaffolding but no bone-growing cells (osteoblasts) or proteins, and comes in fine to coarse pieces called cancellous chips or cubes. Autologous bone harvested from the patient can also be used for its calcium scaffolding. It has the advantage of including osteoblasts and bone-growing proteins and the disadvantage of leading to greater morbidity and pain for the patient.¹³

¹¹ http://www.spine-health.com/topics/surg/overview/lumbar/lumb09_ped.html, [nuvasive.com](http://www.nuvasive.com), [blackstonemedical.com](http://www.blackstonemedical.com), [depuyorthopaedics.com](http://www.depuyorthopaedics.com), [spinalconcepts.com](http://www.spinalconcepts.com)

¹² http://www.spine-health.com/topics/surg/overview/lumbar/lumb09_cage.html, [depuyorthopaedics.com](http://www.depuyorthopaedics.com)

¹³ <http://www.spine-health.com/topics/surg/overview/lumbar/lumb10.html>, <http://www.therics.com/allograft.html>

Additionally, there are a large number of different products on the market that can provide the necessary scaffolding and eliminate the need for bone grafts, including hydroxyapatite (a form of calcium) products and coral. An example of one of these products that does not originate from human bone is Depuy Orthopaedic's Healos® strips. These are moldable sponge-like strips made of cross-linked collagen fibers coated with hydroxyapatite.¹⁴

III. Osteoinductive Implants

Osteoinduction, or bone growth promotion, is the next necessary step in performing fusion once the spine is immobilized and scaffolding is in place on which new bone can grow. One way in which osteoinduction takes place is through bone morphogenic proteins, or BMPs, which change cells into bone-producing cells and are naturally produced during the process of skeletal healing. These proteins are sometimes introduced through autologous bone, malleable putties made out of bone that has had its calcium removed (known as demineralized bone matrix or DBM), or collagen-based sponges. A large variety of putties and sponges exist on the market and some have osteoconductive as well as osteoinductive characteristics. Insertion of BMP is coded using ICD-9 code 84.52.¹⁵

In addition to BMPs, implantable electrical stimulators are recommended for patients who may have difficulty with the bone healing process. These devices include a battery pack that is placed under the skin and wires that lay on top of a muscle attachment site. The insertion of such a stimulator is coded using ICD-9 code 78.9.¹⁶

IV. Devices for Pain Reduction

In addition to stimulators for promoting bone growth, implantable electrical neurostimulators that reduce pain also exist. The insertion of these stimulators are coded using ICD-9 code 3.93.¹⁷

¹⁴ <http://www.medcompare.com/itemdetails.asp?itemid=20376>

¹⁵ [http://www.rndsystems.com/asp/grouplist.asp?group=Bone%20Morphogenetic%20Protein%20\(BMP\)%20Family](http://www.rndsystems.com/asp/grouplist.asp?group=Bone%20Morphogenetic%20Protein%20(BMP)%20Family), <http://www.spine-health.com/research/bonegraft/bonegraft04.html>, <http://www.osteotech.com/prodcrunch.htm>.

¹⁶ <http://www.spine-health.com/topics/surg/overview/lumbar/lumb11.html>, <http://www.spine-health.com/topics/surg/stimulator/stim01.html>

¹⁷ <http://www.back.com/treatment-pain-neurostimulation.html>

APPENDIX B

TEMPORARY ADD-ON PAYMENTS FOR NEW TECHNOLOGY

The OMFS includes Medicare's add-on payment to recognize the costs of new medical services and technologies. The add-on applies if the new technology costs are not reflected in the data used to establish the DRG relative weights and the estimated costs for patients receiving the new technology show the DRG payment is inadequate.¹⁸ The additional payment is made for two to three years until the administrative data with the new ICD-9-CM code can be evaluated.

Medicare limits the additional payments to new technologies that provide substantial improvement in caring for Medicare beneficiaries (because the special payment will create an incentive to use the new technology). CMS uses a federal panel of CMS clinical staff and coding experts to evaluate the new technology using the following criteria:

- The device offers a treatment option for a patient population unresponsive to, or ineligible for, currently available treatments.
- The device offers the ability to diagnose a currently undetectable medical condition or diagnose it earlier, and use of the device to make the diagnosis affects patient management.
- Use of the device improves clinical outcomes (e.g., morality rate, complication rate, decreased rate of subsequent interventions, hospitalizations or physician visits, and decreased pain, bleeding or recovery time).

To determine if the DRG payment inadequately reflects the cost of the new technology, CMS compares the standardized charges of cases using the device to a new technology threshold.¹⁹ The applicable thresholds for the DRGs for spinal surgery are shown in Table B.1. For example, if the average standardized charges for patients receiving a specific new technology in DRG 496 exceeds \$75,901 and the other qualifying criteria are met, the new technology would qualify for an add-on payment.

The actual add-on payment for a qualifying new technology is made on a case-by-case basis. If the cost of a particular new technology case exceeds the DRG payment amount, Medicare pays 50 percent

¹⁸ Section 1886(d)(5)(k) of the Social Security Act as amended by Section 533 of the Benefits Improvement and Protection Act of 2000 (Public Law 106-554) and Section 503(b)(1) of the Medicare Prescription Drug, Improvement and Modernization Act (Public Law 108-173).

¹⁹ The threshold is the lesser of: 1) 75 % of the standardized amount (increased to reflect the difference between cost and charges or 2) 75% of one standard deviation beyond the geometric mean standardized charge for all cases in the DRG (or the case-weighted average of all relevant DRGs if the technology occurs in multiple DRGs). Standardized charges are the charges for an inpatient stay after standardizing for the wage index adjustment and add-on payments for teaching and serving low-income patients. According to CMS, the average standard deviation is 50 percent of the log mean. The thresholds are published annual in the PPS final rule.

of the excess cost (not to exceed 50 percent of the estimated cost of the new technology).²⁰ The formula is as follows:

Add-on payment_{t_{ind}} = lesser of: 0.50 X (Estimated cost_{t_{ind}} – (DRG payment_{t_{ind}}) or maximum add-on amount for new technology

Table B.1

**FY2005 Thresholds for Determining
New Technology Add-On Payments**

DRG	Threshold (\$)
496	75,901
497	50,342
498	40,799
519	36,273
520	28,967
531	38,748
532	24,650

Medicare is currently paying an add-on amount for rhBMP provided in connection with lumbar spinal surgery with an interbody spinal fusion device (InFUSE™) or in posterolateral spinal fusions (OP-1 Putty). The estimated cost is \$3,910; therefore, the maximum add-on amount is \$1,955 for cases that qualify for additional payment. The interbody spinal fusion device that is used in conjunction with InFUSE™ (estimated cost: \$4,990) does not qualify for the add-on payment because interbody spinal fusion devices were first approved 9 years ago.

The OMFS includes the Medicare add-on payment for new technology in addition to the pass-through payments for hardware and instrumentation. The differences between the Medicare add-on payment and the OMFS pass-through are that (1) clinical criteria are used to determine whether the device is eligible for a pass-through, (2) payment is made only if the DRG payment is otherwise insufficient, and (3) the full cost of the device is not passed through, thereby providing a stronger incentive to avoid unnecessary utilization.

²⁰ The same cost-to-charge ratio that is used to determine outlier payments is used to determine the estimated case cost. The higher payment amount is treated as the base payment in determining outlier payments.

APPENDIX C

DATA SOURCES AND METHODOLOGY

We used OSHPD data and Medicare PPS impact files to do this analysis. The specific data sources were:

- **OSHPD Claims Data.** We used OSHPD inpatient administrative data for discharges occurring in 2003. The OSHPD data elements for each discharge include OSHPD provider number, expected payor, FY 2003 DRG assignment, total charges, and length of stay. We retained the discharges for which either workers' compensation and Medicare was the expected payor and the discharge was assigned to DRGs 4, 496–498, 519 and 520. We eliminated discharges for which no charges were reported. Most of those discharges were for stays in facilities owned by Kaiser Permanente that are not required to report charges. With no charge data, one cannot compare the resources required to treat workers' compensation discharges relative to Medicare discharges nor estimate the cost of the stay. We also eliminated statistical outliers- 115 Medicare discharges and 63 workers' compensation discharges with total charges that were 3 standard deviations above or below the geometric mean charges for discharges assigned to the same DRG with the same payor.
- **Medicare PPS Impact Files.** The Medicare PPS Impact File is a public use file that contains the hospital-specific payment parameters to pay acute care hospitals under the prospective payment system (PPS) for inpatient hospital services, including the wage index, additional adjustment factors for teaching and serving low-income patients, and cost-to-charge ratios for determining outlier payments.
- We used the PPS impact file for FY03 to derive the hospital-specific composite rate, outlier threshold and cost-to-charge ratio (CCR) for each hospital with discharges in the spinal surgery DRGs. To develop the composite rate, we adjusted the standard rates for operating and capital costs for the area wage index applicable to the geographic location of the hospital and any adjustments for teaching activities and serving low-income patients. We applied the same adjustments to the standard outlier threshold to determine a hospital-specific outlier threshold. We used these factors to simulate payments for the 2003 workers' compensation discharges in the spinal surgery DRGs.

We simulated 2003 payments under the OMFS using the following formulae.

Standard payment = composite rate X DRG relative weight X 1.20.

Outlier payment = (charges X FY03 CCR – (standard payment + outlier threshold)) X .90

The purpose of the simulation was to compare payments to estimated costs. A methodological issue was what cost-to-charge (CCR) ratio to use to estimate 2003 costs. Hospital charging practices affect the accuracy of the cost estimate. First, hospitals have different charge structures for the services they provide and there are limitations on the extent to which this can be taken into account. In theory, a hospital's charges should be consistently related to its costs. An overall CCR reflects the hospital's average markup across all services, but there can be substantial differences in hospital markups for particular types of services. Generally, the markup is higher for ancillary services and devices than for inpatient "room and board" services and for high cost stays (e.g., orthopedic surgical procedures) than for lower cost stays. We are limited to using an overall CCR for this analysis and do not have the detailed charge information needed to know how a particular hospital's average markup (or CCR) for spinal surgery discharges compares with that for other services. In addition, the CCR is derived from a comparison of charges and accounting costs for Medicare inpatient services. We do not know whether an overall CCR for Medicare patients is representative of a CCR for the workers' compensation spinal surgery discharges.²¹

Second, hospital charges have been rising more rapidly than costs. The charge increases have been driven by payment arrangements that are based on charges. Examples are managed care stop-loss agreements to pay at least a minimum percentage of charges and Medicare's use of charges in determining outlier payments. As a result, a CCR that is derived from an earlier period than the administrative data tends to overstate costs. Under the policies in effect in FY03, the CCR on the FY03 impact file was based on the most recently *final* settled cost report. The cost reporting period from which the CCR is derived is not provided on the impact file; however, the cost report needed to have been final settled by July 2002 and most likely covered a period ending in 2000 or earlier. Because hospital charges have been rising more rapidly than costs, using an old CCR will tend to overstate costs. We decided not to use the FY03 CCR to estimate actual costs although, consistent with Medicare payment rules, we used the FY03 CCR to estimate 2003 outlier payments.

In response to abuses in outlier payments attributable to rapid charge increases, Medicare revised its outlier policies effective in FY04 to require that the CCR used to determine outlier payments be based on the most recently *tentatively* settled (before audit) cost report. Thus, the lag between the time period used to derive the CCR and the fiscal year it is used to determine outlier payments has been reduced. The FY05 CCR are the most recent available CCR and reflect the CCR from a hospital's most recent tentatively settled cost report as of July 2004. Assuming tentative settlement occurs at about eight months after the close of the cost reporting period, it is likely that the CCR on the FY05 impact file was derived from a cost reporting period ending in 2003 for the majority of hospitals with spinal surgery discharges (because most discharges are from hospitals with fiscal years ending June 30). Thus, the CCR on the FY05 impact file is likely to have covered some of 2003 with the exception of hospitals with reporting periods ending December 31. The CCR for these hospitals is more likely to be based on their cost reporting period ending December 31, 2002.

We categorized each discharge by its usage of hardware and instrumentation reported in the administrative data using the following procedure codes:

²¹ The Medicare cost report has charges and costs by hospital department. If charges by department were available, one could determine the estimated cost per discharge by applying the departmental cost-to-charge ratio to the departmental charges. The OSHPD administrative data have only total charges and further investigation of this issue is beyond the scope of this study.

- Interbody cages (84.51)
- Insertion of BMP (84.52)
- Insertion of bone growth stimulators (78.9)
- Insertion of neurostimulators for pain (3.93).

We created separate categories for those discharges with multiple procedure codes (e.g., interbody cages (84.51) and insertion of BMP (84.52)). The current pass-through applies to any hardware or instrumentation used during spinal surgery. We cannot identify routine items because a specific procedure code has not been established for these items. Our assumption is that an analysis of the comparative usage rates and payment-to-cost ratios for the identified procedures will be indicative of whether alternative payment policies should be considered.

We computed usage rates by type of product by DRG and summarized them at the DRG level by product. We also determined usage rates for each hospital that performed at least 20 spinal surgeries on workers' compensation inpatients. Each procedure code was counted and some discharges received multiple procedures. We compared the hospital's actual usage rate with the its expected usage rate based on the usage rates across all hospitals for the same mix of DRGs.

- We calculated the expected usage rate by multiplying the hospital's discharges in each DRG by the percentage of discharges in that DRG that used the product across all hospitals and summing the results across all the hospital's discharges.

$$\text{Expected usage} = \sum \text{DRG 4 discharges}_{\text{hosp } i} \times \% \text{ DRG 4 with hardware}_{\text{all hosp}} + \text{DRG 496 discharges}_{\text{hosp } i} \times \% \text{ DRG 496 with hardware}_{\text{all hosp}}$$

- For the 93 hospitals with more than 20 workers' compensation spinal surgery discharges, we computed a ratio of actual to expected usage. A hospital with a ratio of .50 used hardware one-half as often as the DRG-mix adjusted average for workers' compensation patients. A hospital with a ratio of 2.0 uses twice as much hardware relative to the average for workers' compensation patients.