

## SECTION III

# REGULAR AND SPECIAL FEATURES

### Payer Type Has Little Effect on Operative Rate and Surgeons' Work Intensity

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**Does health-care payer type affect the rate of operative treatment and surgeons' work intensity for patients with orthopaedic conditions? We analyzed the clinical and financial data collected during 6 consecutive years (1999–2004) for a group practice of 40 orthopaedic surgeons. We examined the rate of operative treatment and surgeons' work intensity (total physician's work Resource-based Relative Value System units) by diagnosis, patient age, and payer type. The eight payer types were: capitation health maintenance organization, health maintenance organization, preferred provider organization, indemnity, self-pay, Workers' Compensation, Medicaid, and Medicare. There were 230,306 patients with 526 unique primary diagnoses. Diagnosis accounted for most of the variability in operative rates and surgeons' work intensity. After adjusting for differences attributable to diagnosis, payer type had little effect on the rate of operative treatment and surgeons' work intensity.**

**Level of evidence: Level II, Prognostic study (retrospective cohort). See the Guidelines for Authors for a complete description of levels of evidence.**

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The public and media have questioned whether physicians alter the treatment provided to patients when confronted with incentives and restrictions imposed by third-party payers.<sup>3,15,22</sup> Some physicians report altering treatment in response to pressures by third-party payers,<sup>24</sup> and specialty medical societies think managed-care payers may limit specialized care.<sup>1,2</sup> Patients are concerned that incentives or restrictions may limit the type of treatment they receive and these limitations will affect the quality of their health care.<sup>15,22</sup>

Despite these perceptions, whether the incentives and restrictions imposed by third-party payers actually cause orthopaedic surgeons to alter the care they deliver has not been investigated. Treatment type, intensity, and duration obviously vary by diagnosis, therefore it is important to account for potential differences in the distribution of diagnoses among payer types when evaluating for differences in the care actually delivered to those groups.

We hypothesized that the rate of operative treatment and the surgeons' work intensity would not differ among payer types after accounting for diagnosis.

#### MATERIALS AND METHODS

We abstracted data prospectively collected in a computerized database system constructed as part of an ongoing outcomes initiative at our facility. From this database, we abstracted patient demographics (age and gender), patient insurance information, and clinical information. Our variables included patient age and gender, primary diagnosis (ICD-9-CM code), Current Procedural Terminology (CPT) codes, the associated Resource-based Relative Value System units for each CPT code, patients' payer types, and the number of office visits. These data were

abstracted for the entire population of 244,435 patients treated by a group practice of 40 orthopaedic surgeons in a large metropolitan area during 6 years from 1999 to 2004.

We included only primary diagnoses that included at least 30 patients. There were 526 unique primary diagnoses with at least 30 patients; 29 diagnoses accounted for 50% of the patients (Table 1). We excluded 14,255 patients because their primary diagnoses did not meet the minimum sample size, which left 230,306 patients (94% of the population). There were 119,494 females with an average age of 42.4 years (SD = 22.3 years) and 110,812 males with an average age of 36.8 years (SD = 21 years).

The sample size of 230,306 patients had a statistical power greater than 99% ( $\alpha = 0.01$ ;  $\beta = 0.01$ ) to detect payer-type group differences less than 0.1% for the rate of operative treatment, and less than 0.1 Resource-based Relative Value System units for surgeons' work intensity. This finding meant it was a virtual certainty we would detect statistically significant differences among the payer types at conventional significance levels (ie,  $p < 0.05$  and  $p < 0.01$ ).

This robust statistical power therefore had the ability to detect statistically significant differences among payer types that may not have any practical importance or clinical relevance. Before testing our hypotheses, we defined clinically relevant effect sizes

to be a 5% or larger difference in the rate of operative treatment and 2.0 Resource-based Relative Value System units or larger difference in surgeons' work intensity. These definitions were developed by the consensus of the research committee at our institution consisting of orthopaedic surgeons, data analysts, and administrative personnel. These effect sizes represent differences among payer types equivalent to at least one additional patient receiving operative treatment for every 20 patients with a particular diagnosis, and to the average surgeons' work intensity for one office visit (2.0 Resource-based Relative Value System units). This study was reviewed and approved by our institutional review board.

Operative treatment was identified as the CPT codes ranging from 10000 to 69999, excluding procedures performed in the clinic (eg, joint injections, closed fracture reductions, casting). For each diagnosis group, the rate of operative treatment was the number of patients receiving operative treatment divided by the total number of patients in the diagnosis group. Surgeons' work intensity was determined by adding the Resource-based Relative Value System units for the physician work component of all of the CPT codes associated with the primary diagnosis. The malpractice and practice expense Resource-based Relative Value System components were not included in these analyses. During the study period, 46,825 of the 230,306 patients received opera-

**TABLE 1. Most Common Primary Diagnoses**

ICD-9-CM Code	Description	Number of Patients	Percent of Total Sample	Rate of Operative Treatment
719.46	Pain in joint, lower leg (patellofemoral syndrome)	16,084	7.0%	27%
724.20	Lumbago (low back pain)	9011	3.9%	4%
715.96	Osteoarthritis, lower leg (knee)	7084	3.1%	24%
813.42	Fracture, distal radius	6932	3.0%	18%
719.41	Pain in joint, shoulder region	6305	2.7%	16%
726.10	Rotator cuff syndrome	5310	2.3%	14%
354.00	Carpal tunnel syndrome	4204	1.8%	47%
845.00	Ankle sprain	4038	1.8%	4%
717.70	Chondromalacia of patella	3970	1.7%	21%
836.00	Tear of medial cartilage or meniscus of knee	3956	1.7%	58%
729.50	Pain in limb	3832	1.7%	7%
719.47	Pain in joint, ankle and foot	3439	1.5%	7%
719.45	Pain in joint, pelvic region and thigh (hip)	3410	1.5%	11%
726.32	Lateral epicondylitis	3248	1.4%	6%
825.25	Fracture, metatarsal bone(s)	3198	1.4%	5%
840.40	Sprains and strains, rotator cuff (capsule)	3146	1.4%	37%
722.52	Degeneration of lumbar or lumbosacral disc	3138	1.4%	15%
723.10	Cervicalgia	3009	1.3%	6%
728.71	Plantar fascial fibromatosis	2683	1.2%	14%
844.20	Sprains and strains, cruciate ligament of knee	2507	1.1%	60%
722.10	Cervical spondylosis with myelopathy	2452	1.1%	18%
815.00	Fracture, metacarpal bone(s)	2067	0.9%	11%
717.30	Internal derangement of knee, medial meniscus	1998	0.9%	60%
812.41	Supracondylar fracture of humerus	1915	0.8%	27%
727.10	Bunion	1887	0.8%	53%
737.30	Scoliosis (and kyphoscoliosis), idiopathic	1875	0.8%	4%
816.01	Fracture, middle or proximal phalanx/phalanges	1836	0.8%	13%
824.20	Fracture, lateral malleolus	1748	0.8%	17%
715.95	Osteoarthritis, pelvic region and thigh (hip)	1709	0.7%	36%
Total		115,991	50.4%	21%

tive treatment, for an overall rate of 20.3%. The rate of operative treatment for the diagnosis groups ranged from 0% for kyphosis (acquired/postural) (ICD-9 = 737.10) to 88.3% for an open radius-ulna shaft fracture (ICD-9 = 813.33).

There were eight payer types. There were three managed-care payer types: capitation health maintenance organization (HMO) (15,899 patients; 6.9%), HMO (35,655 patients; 15.5%), and preferred provider organizations (PPO) (117,798 patients; 51.1%). There were three nonmanaged-care payer types: indemnity (3335 patients; 1.4%), self-pay (13,040 patients; 5.7%), and Workers' Compensation (12,912 patients; 5.6%). There were two government payer types: Medicaid (4749 patients; 2.1%) and Medicare (26,929 patients; 11.7%). By comparison, the approximate national distribution of these payer types in 2001 to 2002 for patients attending any type of physician office visit were: 14% HMO (capitation HMO or HMO), 42% PPO, 4% indemnity, 4% self-pay, 2% Workers' Compensation, 8% Medicaid, and 21% Medicare (5% unknown).<sup>8,23</sup>

Capitation HMO payers were those with whom the orthopaedic group had a contractual agreement in which they received a standard fee per month for each enrolled person; patients enrolled with capitation HMO payers often required a referral for specialty care, but not the payer's authorization. Health maintenance organization payers were those with whom the orthopaedic group had a contractual agreement and fee schedule; patients enrolled with HMO payers typically required a referral for specialty care and the payer's authorization. Preferred provider organizations payers were those with whom the orthopaedic group had a contractual agreement and fee schedule; patients enrolled with PPO payers typically did not require a referral for specialty care, but did require the payer's authorization.

Indemnity payers were those with whom the orthopaedic group had no contractual agreement or fee schedule; patients enrolled with indemnity payers required neither a referral for specialty care nor the payer's authorization. Self-pay patients paid the orthopaedic group directly; they did not require a referral for specialty care or a payer's authorization. Workers' Compensation payers were those with whom the orthopaedic group had a contractual agreement and fee schedule governed by a state agency. Patients enrolled in Workers' Compensation typically did not require a referral for specialty care, but did require the payer's authorization.

Medicaid and Medicare payers were government payers with regulated, fixed-fee schedules and no contractual arrangement with the orthopaedic group. Because the orthopaedic group was not participating in Medicaid or Medicare HMOs, patients did not require a referral for specialty care and the payer's authorization was not required.

We used logistic regression analyses to test the association of payer type with operative rate after adjusting for differences in operative rate attributable to diagnosis. General linear model analyses using Type IV sums of squares to account for empty cells in the design matrix were used to test the association of payer type with surgeons' work intensity after adjusting for differences in surgeons' work intensity attributable to diagnosis. Statistical significance was set at  $p \leq 0.01$ .

## RESULTS

After accounting for diagnosis, the differences in the rates of operative treatment among seven of the eight the payer types were 5% or less (Table 2). Workers' Compensation was 6% to 10% greater in the rate of operative treatment compared with the other payer types ( $p < 0.001$ ). This was equivalent to one or two additional patients out of every 20 patients receiving operative treatment in the other payer types. The logistic regression model correctly predicted surgical status for 82% of the patients (Hosmer and Lemeshow  $\chi^2 = 3.811$ ;  $df = 8$ ). The rates of operative treatment by payer type for several of the most common diagnoses revealed the same general pattern (Table 3). Patients enrolled in capitation HMO, HMO, or PPO plans had similar rates of operative treatment overall and for the selected common diagnoses. Self-paying patients and patients with Medicaid had slightly lower rates of operative treatment, whereas patients with Worker's Compensation had slightly higher rates. Patients with Medicare had greater rates of operative treatment for osteoarthritis, but otherwise had similar rates as the patients in capitation HMOs, HMOs, and PPOs. During the study period, 46,825 of the 230,306 patients in the cohort received operative treatment, for an overall rate of 20.3%.

**TABLE 2. Mean Rate of Operative Treatment and Mean Physicians' Work RBRVS Units**

Payer Type	Number of Patients	Rate of Operative Treatment After Adjusting for Diagnosis	Work RVRBS Units After Adjusting for Diagnosis
Capitation health maintenance organization	15,899	14%	6.0
Health maintenance organization	35,644	16%	5.6
Preferred provider organization	117,798	15%	6.2
Indemnity	3335	14%	5.7
Self-pay	13,040	11%	4.9
Workers' Compensation	12,912	21%	8.5
Medicaid	4749	13%	5.1
Medicare	26,929	16%	5.7
All payer types	230,306	15%	6.0

RBRVS = Resource-based Relative Value System

**TABLE 3. Rates of Operative Treatment by Payer Type for Six Common Diagnoses**

Payer Type	Osteoarthritis, Knee (715.96)	Osteoarthritis, Hip (715.95)	Pain, Shoulder (719.41)	Chondromalacia Patella (717.70)	Low Back Pain (724.20)	Bunion (727.10)
Capitation HMO	25%	29%	14%	20%	4%	58%
HMO	24%	35%	16%	21%	3%	48%
PPO	24%	36%	15%	20%	4%	54%
Indemnity	16%	33%*	19%	16%	5%	49%
Self-pay	14%	30%	8%	13%	3%	36%
Worker's Compensation	18%	38%*	23%	42%	7%	0%*
Medicaid	12%*	15%*	13%	14%*	3%	75%*
Medicare	26%	37%	16%	21%	4%	53%
All payer types	24%	37%	16%	21%	4%	53%

\*Number of patients < 30; HMO = health maintenance organization; PPO = preferred provider organization

After accounting for diagnosis, the differences in surgeons' work intensity among the payer types were relatively small in terms of actual services delivered (Table 2). For seven of the eight payer types, the differences in surgeons' work intensity were smaller than 2.0 Resource-based Relative Value System units, which was less than the average surgeons' work intensity for one office visit. Workers' Compensation was 2.3 to 3.6 Resource-based Relative Value System units greater ( $p < 0.001$ ) in surgeons' work intensity than all of the other payer types. This surgeon's work intensity was equivalent to one or two additional office visits relative to the other payer types. The average surgeons' work intensity across the entire sample was 5.9 Resource-based Relative Value System units ( $SD = 10$ ). Surgeons' work intensity was 19.6 Resource-based Relative Value System units ( $SD = 15.6$ ) for patients receiving operative treatment and 2.4 units ( $SD = 1.6$ ) for patients receiving nonoperative treatment.

## DISCUSSION

Despite perceptions of interference of certain payer types in the delivery of specialty health care, the actual behavior of specialists when confronted by the incentives and restrictions imposed by third-party payers has not been reported. We investigated whether the type or intensity of health care delivered by orthopaedic surgeons was affected by a patient's payer type, after adjusting for differences attributable to diagnosis. Seven of the eight payer types differed by 0% to 5% in the rate of operative treatment and by 0.1 to 1.3 Resource-based Relative Value System units in surgeons' work intensity. Patients enrolled in managed-care plans or in Medicare or Medicaid did not receive any less treatment than patients enrolled in indemnity plans. The orthopaedic surgeons determined treatment primarily by a patient's diagnosis rather than by insurance type.

Our study has several limitations. First, we had no data regarding medical comorbidities or secondary diagnoses.

Differences in the rate of comorbidities or the presence of clinically important secondary diagnoses may affect the rate of operative treatment or surgeons' work intensity. Second, we had no information regarding the severity of the patients' conditions. The use of ICD-9-CM codes lends limited information regarding severity, and severity may differ dramatically with certain diagnoses (eg, osteoarthritis of the knee), which may affect the rate of operative treatment or surgeons' work intensity. Third, the data were abstracted from a group of 40 orthopaedic surgeons in private practice who were working in several types of hospitals (private, nonprofit, academic) in a large metropolitan area. Different results may be observed among orthopaedic surgeons practicing in other settings or regions. Fourth, the group practice may not have entered into contractual arrangements with specific Capitation HMO, HMO, or PPO payers whose reimbursement rates were less than the group was willing to accept. These exclusions may have equalized the relative reimbursement among payer types and thereby lessened the incentive to limit care.

The adjusted rate of operative treatment and surgeons' work intensity were greater in the Workers' Compensation payer type compared with the other payer types. Some investigators have reported patients receiving compensation for a workplace injury had a longer recovery period than patients with similar injuries who were uncompensated.<sup>8,10,19</sup> The observed differences may have been related to work demands, which typically are greater in patients receiving care under a Workers' Compensation plan.<sup>18,21</sup> In addition, patients covered by Workers' Compensation generally have lower pretreatment health-status ratings, indicating the effects of their physical injury may be compounded by psychosocial issues such as fears over losing a job and being unable to provide for a family.<sup>12,13</sup> These factors may explain the increased rate of operative treatment and increased surgeons' work intensity among patients in the Workers' Compensation group.

Our findings help to advance the understanding of the role of payer type in the delivery of orthopaedic health care. In a previous study, we determined orthopaedic practice expenses averaged \$99 per office visit.<sup>6</sup> We also found nonvalue-added activities, which add no value to the services being delivered to the patient, accounted for 17% of all practice expenses.<sup>6</sup> In a subsequent study, we found payer type affected overall practice expenses, and was the dominant factor in the determination of nonvalue-added activity expenses.<sup>5</sup> Results of our current study suggest payer type, with the exception of Workers' Compensation, had no clinically relevant effect on the type and intensity of orthopaedic treatment. Although certain payer types increased the cost of providing orthopaedic treatment by increasing administrative burdens, the orthopaedic treatment delivered was not influenced by payer type.

The eight payer types differed with respect to four factors: (1) fee-for-service payment (ie, a fee schedule) versus capitated payment; (2) the presence or absence of a contractual arrangement with the orthopaedic group; (3) the requirements for referral to access specialty care; and (4) the requirements for pretreatment authorization. Because seven of the eight payer-type groups did not differ appreciably with respect to the rate of operative treatment or surgeons' work intensity, the four factors that distinguished the payer types had no clinically relevant effect on the treatment.

Several investigators have studied how payer type affects utilization and quality of care in various nonorthopaedic health care settings.<sup>14,16,17</sup> A survey of large provider networks done in the late 1980s showed physician payment through capitation or salaries as opposed to fee-for-service payments decreased the rates of hospitalization and outpatient visits.<sup>14</sup> However, more recent studies do not show a clear effect of managed care on utilization or quality of care.<sup>16,17</sup> For example, a national study showed managed-care plans did not affect access, utilization, or quality of children's medical care compared with other types of health insurance after controlling for various confounding variables.<sup>17</sup> Similarly, patients 65 years or older in Minnesota who were randomly enrolled in a Medicaid managed-care plan or a Medicaid fee-for-service plan had no differences in general health or functional status after 12 months of coverage.<sup>16</sup>

Despite an apparent equity of care for patients in managed-care plans, dissatisfied patients still think physicians alter treatment when third-party payers create incentives and restrictions.<sup>3,15,22</sup> Managed care reduces patient satisfaction and presents different barriers to care than do more traditional insurance plans.<sup>20</sup> Access to specialists is one of the primary determinants of satisfaction with health care.<sup>7</sup> Patients with orthopaedic conditions who are enrolled in health-care plans that have a gatekeeper are less

satisfied than those enrolled in plans with no gatekeeper.<sup>4</sup> Physicians who perceive they have incentives from payers to decrease care also report having higher rates of dissatisfaction with their practice.<sup>11</sup> The negative image of certain payer types may stem from dissatisfaction of the patient and provider regarding their perceptions about barriers to accessing specialty care, additional administrative burdens, and practice restrictions rather than from any real differences in health-care delivery.

Payer type had a relatively small effect on the rate of operative treatment or surgeons' work intensity after accounting for diagnosis, with the exception of Workers' Compensation. Orthopaedic surgeons provided treatment based primarily on diagnosis.

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