INCREASED COSTS AND RATES OF USE IN THE CALIFORNIA WORKERS' COMPENSATION SYSTEM AS A RESULT OF SELF-REFERRAL BY PHYSICIANS

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Abstract *Background.* There is widespread concern that ownership by physicians of testing or treatment facilities to which they refer patients leads to overuse of such facilities. We determined the patterns of use of three services — physical therapy, psychiatric evaluation, and magnetic resonance imaging (MRI) — among physicians treating patients whose care was covered under workers' compensation. We then compared the rates of use among physicians who referred patients to facilities of which they were owners (self-referral group) with the rates among physicians who referred patients to independent facilities (independent-referral group).

Methods. We used a large data base to analyze claims under workers' compensation in California from October 1, 1990, through June 30, 1991, to determine the frequency and cost of these three selected services and determined whether the referring physicians were practicing self-referral or independent referral. We evaluated the cost per case for all three services, measured the frequency with which physical therapy was initiated, and evaluated the medical appropriateness of MRI.

Results. We found that physical therapy was initiated 2.3 times more often by the physicians in the self-referral group (68 percent) than by those in the independent-referral group (30 percent; $P<0.01$). The mean cost per case for physical therapy was significantly lower in the self-referral group ($404±102) than in the independent-referral group ($440±167; $P<0.01$).

The mean cost of psychiatric evaluation services was significantly higher in the self-referral group than in the independent-referral group (psychometric testing, $1,165±728 vs. $870±482; $P<0.01$; psychiatric evaluation reports, $2,056±1,063 vs. $1,680±578; $P<0.01$). The total cost per case of psychiatric evaluation services was 26.3 percent higher in the self-referral group ($3,222±1,451) than in the independent-referral group ($2,550±742; $P<0.01$).

Of all the MRI scans requested by the self-referring physicians, 38 percent were found to be medically inappropriate, as compared with 28 percent of those requested by physicians in the independent-referral group ($P<0.05$). There was no significant difference in the cost per case between the two groups.

Conclusions. This study demonstrates that self-referral increases the cost of medical care covered by workers' compensation for each of the three types of service studied. (N Engl J Med 1992;327:1502-6.)

THERE is growing concern about conflict of interest in medicine in the United States.[1-6] Recent studies have focused on whether physicians' ownership of testing or treatment centers increases the number of tests and services performed.[7-10] Research in Florida indicates that physician-owned facilities generate significantly higher rates of use and costs than independently owned facilities.[7,8] Studies of physician ownership in California have found that the higher concentration of physician-owned magnetic resonance imaging (MRI) facilities in California has increased rates of use between 34 percent and 56 percent above the rates for the rest of the country.[9] The study by Hillman et al. of diagnostic imaging demonstrated that physicians who referred patients to facilities of which they were owners (those who practiced self-referral) charged 4.4 to 7.5 times more per episode of care than other physicians.[10] In response to these findings, the states of Florida, Michigan, and New Jersey have enacted legislation that restricts self-referral by physicians.

The American Medical Association (AMA) Council on Ethical and Judicial Affairs stated in December 1991: "In general, physicians should not refer patients to a health care facility outside their office practice at which they do not directly provide care or services when they have an investment interest in the facility."[11] In June 1992, however, the AMA's House of Delegates adopted a new policy that allows doctors to make such referrals if patients are informed of the doctor's financial interest in the facility and of any available alternatives.[12] This reversal on the part of the AMA reflects the lack of consensus within organized medicine about physicians' ownership of medical facilities. There have also been two recent efforts by the federal government to limit self-referral on the part of physicians. Since January 1992, physicians have been prohibited from referring patients to clinical laboratories in which they have an ownership interest. In addition, the "safe harbor" regulations published in the *Federal Register* defined more clearly the investment, ownership, and reimbursement arrangements in which physicians may participate without fear of violating anti-kickback provisions of Medicare and Medicaid.[13]

To our knowledge, the effects of physician self-referral within the workers' compensation system have not been systematically analyzed. To investigate this issue, we evaluated a total of 6581 California workers' compensation cases for which claims were filed with a large workers' compensation insurance company during a nine-month period in 1990 and 1991. We analyzed the effect of physicians' self-referral on three high-cost medical services covered under workers' compensation: physical therapy, psychiatric evaluation, and MRI. We evaluated the cost per case for all three services, measured the frequen-

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cy with which physical therapy was initiated, and prospectively analyzed the medical appropriateness of MRI.

Methods

This study was designed to compare the patterns of use of three services — physical therapy, psychiatric evaluation, and MRI — among physicians who refer patients to facilities of which they are owners (self-referral group) and physicians who refer patients to independent facilities (independent-referral group).

Since differences in case mix between physicians in the self-referral and independent-referral groups might account for differences in rates of use or cost, we classified all cases according to the Ambulatory Visit Groups (AVG) classification scheme,[14] which we have modified for workers' compensation cases.[15] The AVG system is analogous to the system of diagnosis-related groups currently used by Medicare to reimburse acute care hospitals. On the basis of the patient's diagnosis (the diagnostic code from the *International Classification of Diseases, 9th Revision, Clinical Modification)* and the medical-procedure codes of the California Relative Value Studies and *Current Procedural Terminology* for outpatient services in each case, the AVG system is used to assign that case to 1 (and only 1) of 571 groups.

Type of Referral

Throughout the study, self-referral was defined as a referral for a medical service made by a physician or clinic to an entity owned entirely or in part by the referring physician or clinic. Self-referral was defined by either of the following two patterns: referral services were provided under the same tax identification number as the primary service, or referral services were provided under a different tax identification number from the primary service, but one or more owners were common to both entities.

When services were delivered under different tax identification numbers, we searched commercially available data bases that list officers, stockholders, and partners of facilities (the California Fictitious Business Name Listing, the Executive Business Listing, and other state and national data bases on corporations and limited partnerships available from Information America, Atlanta). If this search failed to identify common ownership, we then directly telephoned the referring physician's office and inquired about common ownership.

Physical-Therapy and Psychiatric-Evaluation Services

We used one of California's largest data bases on workers' compensation claims (that of the Industrial Indemnity Co., San Francisco) to analyze the frequency and cost of physical-therapy and psychiatric-evaluation services provided to injured workers. The data base was selected because it was complete and contained information on a large number of patients distributed throughout California. Information about each case was stored longitudinally; thus, the data base contained claims information for all services provided to the injured worker during the entire nine-month period of the study.

Data on all patients covered by workers' compensation in California who received physical-therapy or psychiatric-evaluation services from October 1, 1990, through June 30, 1991, were analyzed. Our analysis compared the rates of use and costs of physical-therapy and psychiatric-evaluation services for physicians in the self-referral and independent-referral groups.

Since musculoskeletal injuries make up the majority of all workers' compensation medical cases, we were able to limit our evaluation of physical therapy to providers with substantial experience in treating industrial musculoskeletal injuries. We defined this degree of experience as the treatment of 10 or more cases of musculoskeletal injury during the study period. There were 76 providers who met this criterion; they treated 1257 cases of musculoskeletal injury. Using the method described above, we were able to determine in all instances whether the referring providers were in the self-referral group or the independent-referral group.

In California, patients covered by workers' compensation are most frequently referred for psychiatric-evaluation services to document a claim of "stress." This evaluation virtually always includes both psychometric testing and a psychiatric-evaluation report. (We documented this fact in a preliminary analysis of our data base.) We therefore limited our analysis of psychiatric-evaluation services to cases in which there was both psychometric testing and a psychiatric-evaluation report. Altogether, 1751 (39 percent) of the cases within the data base met this criterion. A random sample of 220 cases (13 percent) was selected for analysis of ownership. We were able to determine ownership and self-referral or independent-referral status in each of these cases.

MRI

We also compared the cost and appropriateness of MRI scans in the self-referral and independent-referral groups. Appropriateness of referral for an MRI scan was determined under a prospective precertification program. All physicians' requests for MRI scans (regardless of the body part to be examined) were referred by Industrial Indemnity to a national, independent utilization-review firm for precertification review of medical appropriateness. The firm's criteria for appropriateness were established by a panel of board-certified specialists in orthopedics, industrial medicine, and radiology. After initial development by an independent board-certified radiologist and the medical directors of the utilization-review firm and its parent (one of the three largest companies managing health maintenance organizations in the United States), the criteria were reviewed and revised by a panel of independent, practicing experts in managed care who were all board-certified in orthopedics, neurology, neurosurgery, or radiology.

On the basis of medical documentation of the patient's injuries and conversations with the physician who requested the MRI, the review firm gave an opinion on the medical appropriateness of the procedure before it was performed. The reviewers were blinded to the physician's relation with the MRI center.

The classification of a procedure as medically inappropriate could be appealed. To be certain that the reviewer's decision did not merely defer an appropriate scan to another date, cases in which the MRI was categorized as medically inappropriate were followed for an additional six months. In all cases in which a scan was approved within six months after the original request, the MRI was considered to be medically appropriate.

All 864 requests for MRI scans from January 1, 1991, through June 30, 1991, were evaluated. We were able to determine whether the physician had an ownership interest in the facility in 502 (58 percent) of these cases.

Statistical Analysis

Continuous variables are presented as means ±SD and were compared by two-tailed t-tests. The proportion of cases in each group was assessed by the chi-square test. For all analyses, a P value of less than 0.05 was considered to indicate statistical significance. Results were analyzed with use of the Crunch4 Statistical Package (Oakland, Calif.).

Results

Physical Therapy

Table 1 shows the 1257 cases of musculoskeletal injury (whether or not the patients received physical therapy) according to AVG and type of provider (whether the provider practiced self-referral or independent referral). Four AVGs account for 92 percent of all cases; there was no significant difference in the distribution of AVGs between the self-referral and independent-referral groups.

As shown in Table 2, physical therapy was initiated more than twice as often by physicians in the self-referral group (in 68 percent of the cases) as by those

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in the independent-referral group (30 percent; P<0.01). The mean cost per case for physical therapy in the self-referral group ($404±102) was significantly lower than that in the independent-referral group ($440±167; P<0.01).

Psychiatric-Evaluation Services

Table 1 classifies the random sample of 220 cases in which patients received both psychometric testing and psychiatric-evaluation services, according to AVG and provider type. There was no significant difference in the distribution of AVGs between the two types of providers. As Table 2 shows, the mean cost per case for psychiatric-evaluation services was 26 percent higher in the self-referral group ($3,222±1,451) than in the independent-referral group ($2,550±742; P<0.01). This difference was due to the higher cost of psychometric testing ($1,165±728 vs. $870±482; P<0.01) and the greater number of tests per case and to the higher costs of psychiatric-evaluation reports ($2,056±1,063 vs. $1,680±578; P<0.01) (since psychometric tests are reimbursed according to the California Official Medical Fee Schedule, which pays the same amount for each psychometric test regardless of the test, the cost per case for these reports is directly proportional to the number of tests performed).

Table 1. Distribution of AVGs and Mean Cost per Case in the Self-Referral and Independent-Referral Groups.*

AVG Code and Category	Cases: Self-Referral	Cases: Independent Referral	Cost per Case: Self-Referral	Cost per Case: Independent Referral
	no. (%)		mean ±SD ($)	
Physical therapy				
824 Medical back problems†	632 (62)	135 (56)	406±98	448±131
825 Tendonitis	162 (16)	43 (18)	384±119	451±177
829 Strain of arm or shoulder	87 (9)	18 (8)	413±88	360±234
826 Wound or fracture of arm or shoulder	58 (6)	18 (8)	381±122	401±188
828 Trauma to fingers or toes†	42 (4)	12 (5)	416±95	261±200
Other‡	36 (4)	14 (6)	444±111	789±1
Total‡	1017 (100)	240 (100)	404±102	440±167
Psychiatric services				
824 Medical back problems‡	61 (39)	24 (37)	3,230±1,493	2,340±697
2120 Minor wounds and injuries	58 (37)	18 (28)	3,215±1,420	2,887±743
1941 Individual supportive therapy	14 (9)	8 (12)	3,114±1,465	2,214±626
1945 Unscheduled crisis	10 (6)	3 (5)	2,929±1,153	2,314±929
1923 Other mental disturbances	6 (4)	7 (11)	4,372±1,967	2,744±748
Other	6 (4)	5 (8)	2,780±1,091	2,751±736
Total‡	155 (100)	65 (100)	3,222±1,450	2,549±742
MRI				
824 Medical back problems	273 (87)	165 (88)	981±231	994±171
829 Strain of arm or shoulder	30 (10)	14 (7)	936±179	874±79
Other	12 (4)	8 (4)	964±199	1,103±180
Total	315 (100)	187 (100)	976±226	990±170

*AVG denotes the Ambulatory Visit Groups classification.[14] There were no significant differences in the distribution of AVGs for physical therapy, psychiatric-evaluation services, or MRI between the self-referral group and the independent-referral group, by the chi-square test. Percentages do not always total 100, because of rounding.

†Differences in cost between the self-referral and independent-referral groups were significant (P<0.05) by t-test.

‡Differences in cost between the self-referral and independent-referral groups were significant (P<0.01) by t-test.

MRI Scans

Tables 1 and 2 show the results of our study of the medical appropriateness of MRI scans. A total of 502 requests for precertification were received from imaging centers in which ownership could be identified. In Table 1, these cases are classified according to AVG and provider type. There was no significant difference in the distribution of cases between the self-referral and independent-referral groups.

As shown in Table 2, 38 percent of the scans requested by physicians in the self-referral group were found to be medically inappropriate, as compared with 28 percent of those requested by physicians in the independent-referral group (P<0.05). There was no significant difference in cost per MRI procedure between the two groups.

Discussion

This study demonstrates that self-referral increases the cost of medical care under workers' compensation for each of the three types of service studied, but by a different mechanism in each instance: by substantially increasing the percentage of injured workers who receive physical therapy (which more than offsets the slight decrease in cost per case); by increasing the number of psychometric tests and the cost of psychiatric-evaluation reports; and by increasing the frequency of requests for clinically inappropriate MRI scans. These higher rates of use and higher costs have important implications for workers' compensation expenditures, since self-referral is the predominant form of referral for these services.

Physical Therapy

According to the California Workers' Compensation Institute (CWCI) 1990 Medical Fee Survey of 39 private and public insurers, physical therapy represents 56 percent of all outpatient procedures and 34 percent of all outpatient costs for the treatment of injured workers in California.[16] This represents an increase of 31 percent in the volume of services in relation to other outpatient procedures since the CWCI's 1988 study.[16]

Injured workers usually receive a prescription for treatment from a physician (an orthopedic specialist or physician at an industrial medical or multispecialty clinic) to the physical therapist for specific treatment. Over the years, many physicians and clinics that treat patients covered by workers' compensation have established physical-therapy departments within their general operations or have established separate phys-

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Table 2. Frequency of Use of Services and Cost per Case in the Self-Referral and Independent-Referral Groups.

Variable	Cases			Cost per Case		
	Self-Referral	Independent Referral	Self:Independent Ratio*	Self-Referral	Independent Referral	Self:Independent Ratio*
	no. (%)			mean ±SD ($)		
Physical therapy						
No. of musculoskeletal injuries	1017 (100)	240 (100)	—	—	—	—
Cases with physical therapy	690 (68)†	71 (30)	2.3	404±102‡	440±167	0.9
Psychiatric services						
Cases with psychiatric-evaluation reports	155 (100)	65 (100)	—	2,056±1,063‡	1,680±578	1.2
Cases with psychometric testing	155 (100)	65 (100)	—	1,165±728‡	870±482	1.3
Cost of total evaluation	—	—	—	3,222±1,451‡	2,550±742	1.3
MRI						
Requests for scans	315 (100)	187 (100)	—	—	—	—
Scans found medically inappropriate	121 (38)§	52 (28)	1.4	976±226	990±170	1.0

*The ratio of the number of cases or the cost per case in the self-referral group to that in the independent-referral group.

†The proportion of cases in which physical therapy was ordered in the self-referral and independent-referral groups differed significantly ($P<0.01$), by the chi-square test.

‡The mean cost per case differed significantly between the self-referral group and the independent-referral group ($P<0.01$), by t-test.

§The proportion of cases in which MRI scans were found to be medically inappropriate differed significantly between the self-referral group and the independent-referral group ($P<0.05$), by the chi-square test.

ical-therapy facilities that they own but that are operated as distinct financial entities.

In Florida, Mitchel and Scott recently found that 40 percent of physical-therapy facilities were owned by physicians.[7] Our study focused on California physicians who treat large numbers of musculoskeletal injuries and found that 91 percent of all physical therapy was performed by providers who engage in self-referral (Table 2), and the frequency with which physical therapy was initiated was 2.3 times greater in the self-referral group than the independent-referral group. The cost per case of physical therapy, however, was about 10 percent higher in the independent-referral group.

In this study, there was no significant difference in case mix between the self-referral and independent-referral groups (Table 1). In the absence of measures of severity of illness among outpatients, it is therefore impossible to determine whether the lower cost per case in the self-referral group reflects more efficient care or the provision of physical therapy to patients with less severe injuries, since self-referring practitioners initiate physical therapy at more than twice the rate of independent providers.

Regardless of which hypothesis is correct, this small difference in cost per case is more than offset by the dramatically greater frequency with which self-referring providers initiate physical therapy. As Table 3 shows, for every 1000 workers with musculoskeletal injuries, the costs incurred by the California workers' compensation system would be $143,672 (110 percent) higher if these injured workers were evaluated by self-referring rather than independently referring practitioners.

Psychiatric-Evaluation Services

The CWCI estimates that approximately 6 percent of the total medical payments under workers' compensation were for psychiatric services in 1991.[16] California state law defines a valid claim of work-related stress as one in which the work environment contributes 10 percent or more to a worker's total stress level. Some argue that this definition of compensable workplace stress has created a referral environment that encourages excessive evaluation and testing.

We found that 70 percent of all psychiatric-evaluation services were requested by providers who had an ownership interest in the entity that provided both psychometric testing and psychiatric-evaluation reports (Table 2). Furthermore, evaluation costs were 26 percent higher when this ownership relation existed.

As indicated above, a referral for evaluation virtually always results in charges for two services: psychometric testing and a psychiatric-evaluation report that synthesizes the findings of the psychometric tests with the findings from the psychiatric history and examination. Therefore, if a provider with an economic interest in a facility were motivated more by monetary incentives than one without such an economic interest, we would expect this to be reflected in greater use and higher costs of psychometric testing, as well as a more extensive and therefore more costly evaluation report, which would be required to integrate the results of more extensive testing. As shown in Table 2, the cost of each psychiatric service and the mean cost per case were significantly higher in the self-referral group than the independent-referral group; the differences in cost were as follows: psychometric testing, 34 percent; psychiatric evaluation reports, 22 percent; and total evaluation, 26 percent.

As Table 3 shows, for every 1000 workers receiving psychiatric-evaluation services, the costs incurred by the California workers' compensation system would be $672,000 (26 percent) higher if these workers were treated by physicians in the self-referral group rather than the independent-referral group.

MRI Scans

MRI has gained prominence as the diagnostic imaging tool of choice in the assessment and documentation of specific types of injuries. California cur-

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Table 3. Additional Cost Incurred by the California Workers' Compensation System for Each 1000 Injuries Treated at Self-Referral Rather Than Independent-Referral Rates.

SERVICE	SELF-REFERRAL	INDEPENDENT REFERRAL
Physical therapy		
No. of musculoskeletal injuries	1000	1000
Rate of referral for physical therapy	× .678	× .296
No. of cases with physical therapy	678	296
Cost per case	× $404	× $440
Total cost of physical therapy	$273,912	$130,240
Additional cost per 1000 cases (%)	$143,672 (110)	
Psychiatric services		
No. of cases with psychiatric-evaluation services	1000	1000
Cost per case	× $3,222	× $2,550
Total cost of psychiatric-evaluation services	$3,222,000	$2,550,000
Additional cost per 1000 cases (%)	$672,000 (26)	
MRI		
No. of requests for MRI	1000	1000
Rate of inappropriate scans	× .384	× .278
No. of inappropriate scans	384	278
Cost per case	× $976	× $990
Cost of inappropriate MRI	$374,784	$275,220
Cost differential for appropriate scans*	—	$10,108
Total cost of MRI scans	$374,784	$285,328
Additional cost per 1000 cases (%)	$89,456 (31)	

*Additional cost ($14 per case) of the 722 approved MRI procedures.

rently has approximately 400 MRI machines (Mitchel J: personal communication). Recent studies have shown that such a concentration of imaging centers is associated with higher rates of use. After adjustment for the characteristics of the population, Californians undergo 51 percent more MRI procedures than the national average.[9] Leape et al. similarly concluded that an increased concentration of providers increases rates of use.[17] In their study, regions with a high rate of carotid endarterectomy had twice as many surgeons performing the operation as regions where the rate was low.

We found MRI scans to be medically inappropriate 38 percent more often when ordered by self-referring physicians, suggesting increased rates of use in this group. The higher rate of inappropriateness in the self-referral group may help explain the Florida study's finding that rates of use in these physician-owned facilities were 14 to 65 percent higher than in a control area.[7]

Table 3 illustrates the effects of these requests for medically inappropriate scans. For every 1000 requests for MRI scans, the costs incurred by the California workers' compensation system would be $89,456 (31 percent) higher if these requests were made by self-referring physicians rather than by physicians in the independent-referral group.

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