CWCI
Research Notes
September 2005

Measuring the Value of Medical Treatment Outside ACOEM Guideline Targets on Low Back Soft Tissue Injury Outcomes

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Executive Summary

Over the past decade, California workers' compensation medical treatment costs have increased dramatically. Recent reforms call for the use of a medical treatment utilization schedule and the American College of Occupational and Environmental Medicine (ACOEM) occupational medicine practice guidelines (the Guidelines) to raise the quality of care, reduce unnecessary and ineffective medical treatment, and, as a probable result, rein in costs. Some system stakeholders, however, object to the use of guidelines because they place limitations on individual physicians' ability to make decisions based on "clinical judgment." These stakeholders assert that medical services not explicitly recommended by the guidelines still have value to injured workers.

The public policy challenge is to find an objective way to measure the value of medical treatment to an injured worker when there is no research to provide evidence of that value. This study uses a sample of 107,194 low back soft tissue complaints to construct a series of maximum likelihood regression models. These models measure correlations between the use of common medical procedures and medical treatment payments, time off work (number of paid TD days), temporary and permanent disability indemnity payments, and completion of medical treatment. The models examine two categories of procedures:

1) those not recommended by the ACOEM Guidelines for acute and sub-acute low back soft tissue injuries (x-rays, CAT scans and MRIs); and

2) those recommended with optimal targets (physical therapy and chiropractic manipulation)

Case-mix adjusted results show that when utilization of medical care for low back soft tissue injuries exceeded ACOEM-recommended levels, medical and indemnity payments, treatment durations, and the number of paid TD days were significantly higher for all medical service categories. For example:

- ❑ X-Rays - Each plain film x-ray was associated with an additional $912 in claim costs when compared with a similar claim without an x-ray.
- ❑ Back Surgery - Each spinal fusion or laminectomy was associated with two years of additional medical treatment, an additional 7.6 months of temporary disability, and an additional $89,025 in medical and indemnity claim payments when compared to similar cases without such procedures.
- ❑ Physical Therapy and Chiropractic Manipulation - Claims in which the average number of physical therapy and chiropractic visits exceeded ACOEM targets were associated with an additional $9,972 and $28,713 in average total payments respectively. However, among indemnity claims, modest levels of physical therapy and chiropractic manipulation (at or below ACOEM targets) were associated with reductions in medical and/or indemnity payments.

Stakeholders should recognize the need for flexibility in treating the individual patient, so the finding that specific procedures are associated with higher costs and delayed return to work should not be taken as evidence to support a zero-tolerance policy for exceptions to the ACOEM Guidelines. It is conceivable that medical treatment beyond the Guideline target levels convey psychological benefits or other non-monetary/productivity value to the injured worker. A reasonable middle ground would be to allow differing treatment plans for individuals only for "compelling" reasons, and to try to avoid the wide variations in care that in the past have led to vastly different medical outcomes.

Background

Medical treatment costs in California workers' compensation grew steadily throughout the 1980s and early 90s, but began to accelerate rapidly in the latter half of the 1990s. Between accident years 1996 and 2004, the estimated ultimate medical cost of an indemnity claim doubled from $12,755 to $25,592 (WCIRB 2005). This trend coincided with the increased role of the primary treating physician (PTP) in directing and overseeing the treatment of injured workers in California, which began with the passage of 1993 legislation that gave a rebuttable presumption of correctness to the PTP's opinion for the purpose of calculating permanent disability. That was followed by the Minniear decision, a landmark court ruling handed down in 1996 that broadened the application of the PTP's presumption of correctness to encompass all medical issues -- including the appropriateness of any given medical treatment.

The Minniear decision strengthened the effect of the presumption by limiting a payor's ability to question or object to medical utilization, allowing challenges to the primary treating physician's opinion only if it could be proved that the medical treater's opinion was "wrong." This was an extremely high bar in the appeals process, and could rarely be achieved even when it was clear that a given treatment was not curative. Earlier Institute research (Gardner 2002) documented the association between the Minniear decision and the sharp increase in medical utilization and costs.

During this period, utilization review of medical services by payors was voluntary. In workers' compensation, payors employ utilization review as a payment authorization program, allowing reimbursement for only those services proven effective in specific circumstances. This is critical to assuring the quality of care given to injured workers, as ineffective or inappropriate services often lead to poor outcomes, or at best, make no difference except to increase costs. Prior to the implementation of mandatory utilization review programs in January 2004 (required under SB 228, the 2003 reform), workers' compensation payors could choose to implement a program that was consistent with regulatory requirements, but in disputed cases presented before the Workers' Compensation Appeals Board, the utilization review physician's report was not admissible as evidence and payors still had to overcome the primary treating physician's presumption of correctness.

By 2002, the perception that there were abuses in the use of certain testing and treatment procedures and the continuing acceleration of medical costs had made the primary treating physician's presumption of correctness a target for legislative revision. Over a three-year span, state lawmakers made a number changes to assure that injured workers received quality, cost effective care. SB899, enacted in 2004, was the most recent reform to date. This bill included:

- ❏ A redefinition of "reasonably required to cure or relieve," which was generally restricted or limited to goods and services that are consistent with the medical treatment utilization guidelines adopted by the Administrative Director (or the ACOEM Guidelines until that time).
- ❏ Creation of Medical Provider Networks (MPNs) that must utilize the mandated medical treatment utilization schedule.
- ❏ A strengthening of the mandate to use treatment guidelines, with a new requirement that a preponderance of "scientific medical evidence" is needed to overcome the mandated guideline.
- ❏ Repeal of the primary treating physician's presumption of correctness for all physicians, dates of injury, and all issues.
- ❏ Assignment of the presumption of correctness to the ACOEM Guidelines until adoption of the Administrative Director's medical treatment utilization schedule.

Implementing Medical Treatment Guidelines

Implementation of evidence-based medical treatment and disability management guidelines in the California workers' compensation medical care system has been a multi-faceted process, requiring a significant shift in the mindset of physicians, claims administrators, attorneys, judges and of course, injured workers.

While system stakeholders are becoming familiar with the guidelines, learning to interpret nuances where exact language does not exist and monitoring relevant case law as it appears, changing the mindset of these stakeholders may be the more difficult task. For physicians, this means accepting that payment authorization requests for treatments, goods or services may not be approved if the evidence underlying the guidelines does not support them. Obtaining approval for such requests may require physicians to research the literature for high-grade scientific evidence of the effectiveness of requested treatments that may not have been incorporated in the guidelines. On the other hand, claims administrators, defense attorneys and/or utilization review entities must decide how to interpret and enforce the guideline recommendations, and how to respond to information presented in disputes to assure that injured workers receive appropriate, cost-effective medical care and disability management without increasing legal or disability benefit costs for their policyholders.

Applicant's attorneys and workers' compensation judges have historically asserted that an injured worker's treating physician is the best judge of what is necessary to cure or relieve an industrial illness or injury. Prior to the recent

reforms, this had come to mean that virtually any medical treatment prescribed by the treating physician was approved, without the need to determine proof of effectiveness or benefits that exceeded the risks. By enacting the 2004 changes in Labor Code §4600, however, state lawmakers gave the ACOEM guidelines the rebuttable presumption of correctness until the Administrative Director adopts a medical treatment utilization schedule. Therefore, under current law, only those services that are consistent with the evidence used to develop the ACOEM guidelines are presumed reasonable and necessary.

The Challenge of Expanding Medical Treatment Guidelines Beyond ACOEM

A previous CWCI study (Harris 2004) reviewed the emergence of evidence-based medicine and compared actual utilization in a number of key practice areas to evidence-based recommendations for efficient and effective care. The study noted that a high percentage of work injury claims involve vague and undifferentiated diagnoses. Because guidelines are almost always diagnosis based, this lack of clear, specific diagnoses would make compliance with any guideline difficult, if not impossible. The study then analyzed about 250,000 claims segregated into two categories of low back complaints — soft tissue injuries and nerve involvement injuries. When the actual frequencies of x-rays, CT/MRIs, physical therapy visits, chiropractic care and surgery were compared to guideline recommendations, wide variations in treatment patterns were revealed. Experts in evidence-based medicine have suggested that wide variations in the treatment of a common condition could indicate poor quality of care, and that reducing such variation would be one of the favorable outcomes of using evidence-based medicine. The Harris study also noted that actual levels of service provided far exceeded the levels recommended by the Guidelines in all areas, and that the periods of disability far exceeded the disability periods anticipated by ACOEM.

In preparing to develop the medical treatment utilization schedule mandated by the 2004 reforms, the Commission on Health and Safety and Workers' Compensation and the Division of Workers' Compensation contracted with the RAND Corporation to investigate other guidelines that could replace or augment ACOEM's guidelines in the new schedule. After reviewing more than 70 guidelines for work-related conditions, a physician panel recommended that for the short term, the American Academy of Orthopedic Surgeons (AAOS) guideline for spinal fusion and decompression be added to the ACOEM guidelines, and that in the future the state consider adopting a "patchwork" schedule utilizing various specialty guidelines (Nuckols 2004).

This recommendation inspired an additional analysis by the Institute to compare ACOEM and AAOS guideline content, and to determine the result of adding or substituting the AAOS guideline for the treatment of back problems (Harris 2005). A complicating factor of the RAND recommendation was that the AAOS document does not have a specific guideline for spinal fusion and decompression, as comments pertaining to these two procedures are included in the AAOS Clinical Guideline on Low Back Pain (AAOS 2004). As a result, researchers and policy analysts asserted that if the recommendation was accepted, the entire AAOS Clinical Guideline on Low Back Pain would need to be utilized along with the ACOEM Guidelines. This raised concerns that the treatment utilization schedule could contain conflicting sets of guidelines -- both with a presumption of correctness -- which would in turn lead to increased delays and costs due to disputes and litigation (Harris 2005). Concern also arose about the lack of specificity of some recommendations and the lack of high-grade evidence for others.

Most guidelines, even when based on high-grade clinical evidence, state that providers should take a patient's individual needs (the patient's preferences, co-morbidities and likely adherence to treatment recommendations) into consideration when forming a treatment plan. The ACOEM Guidelines continue to evolve through structured evaluation of both new and established medical evidence, assessment of the grade (quality) of each piece of evidence, and integration of the combined mass of evidence into clinically practical recommendations for treatment. In placing the greatest weight on high-grade evidence, the evaluation of the utility of any given medical procedure or test becomes based on controlled clinical research instead of isolated subjective anecdotes. An evidence base that evolves in this manner is also self-correcting in that clinical assertions remain open to challenge and reinterpretation as new state-of-the-art medical evidence develops.

The lack of a single, all-encompassing medical protocol can create uncertainty among stakeholders as to what is best for individual injured workers. In most cases, case reviewers and guideline developers agree on appropriate care for specific circumstances, but where the circumstances vary, case-specific discussions can be affected by preferences (patient and provider), economic interests, motivation to return to work, worksite factors, and other issues. It is a public policy imperative to evaluate the appropriateness of paying for unproven or inappropriate testing or treatments that are not likely to further the functional recovery of the injured worker.

Research Context

While treatment guidelines should improve whenever high-quality research is added to the evidence base, as noted earlier, some stakeholders object to the use of guidelines because of the limitations they place on individual physicians to make decisions based on "clinical judgment." Those arguing against the use of guidelines assert that medical services not explicitly supported by the guidelines may still have value to injured workers, and that the absence of high-grade medical evidence for a particular procedure is not conclusive proof of a lack of benefit for patients. This leads to the question, "Shouldn't we be able to measure value in a scientific way even when there is no existing research that provides evidence of value?"

The following analyses explore whether medical procedures that are not recommended by the ACOEM Guidelines might still provide benefit to patients through:

- Lower overall medical treatment costs;
- Less time off work (in paid TD days) and lower temporary and permanent disability indemnity costs; and
- Faster completion of medical treatment.

Research Objective

The goal of this study was to explore associations between injured worker outcomes and medical services that are either not recommended by the ACOEM Guidelines or recommended within targeted levels. The study focused on two key dimensions of outcomes among workers who received treatment for low back soft tissue complaints:

Cost: Incremental costs or savings related to incremental units of medical service, with emphasis on total claim costs.

Time: Incremental cost or savings related to incremental units of medical service days, as well as the number of paid temporary disability days.

The research focused exclusively on a relatively homogeneous sample of low back soft tissue complaints, which are among the most common workplace injuries, accounting for an estimated 15 to 20 percent of all workers' compensation claims (Harris 2004). The soft-tissue injuries used in this study did not contain any record of diagnosis codes related to neurological impairment or involvement of the spine. For example, claims with spondylolisthesis, nerve root compression or inflammation, degenerative disc disease or spinal stenosis diagnosis codes were omitted from the final sample.

The authors constructed a series of statistical models to measure the association between additional medical services, treatment days, indemnity payments and temporary disability days and the most common medical services that ACOEM either does not recommend or recommends with utilization targets:

1. Plain film x-rays
2. CAT scans and MRIs
3. Surgery (spinal fusions & laminectomies)
4. Physical therapy
5. Chiropractic manipulation

Data

For this study, the analysts compiled data on injured workers' demographics, claim characteristics, employer characteristics and medical and indemnity benefit payments from CWCI's Industry Claims Information System (ICIS).[1] Nine national or regional (California) workers' compensation insurers, representing approximately 75 percent of the total insurance premium written in the California workers' compensation system, plus two self-insured employers, submitted ICIS data. The study sample was comprised of 107,194 open and closed claims involving 1997-2002 injuries, all of which met ACOEM's definition of low back soft tissue complaints. These claims were representative of the broad range of policies (industry type and premium/payroll size) and worker and claim characteristics (injury type, demographics) found in the overall population of California workers' compensation claims.

The data included all medical and indemnity payments on these claims through December 2003 -- a total of $1.1 billion. The calculations of average x-ray and CT/MRI payments reflect the amounts paid for all images taken on a single date of service. Surgical fees represent the total professional service fee and associated inpatient costs of the surgery for each fusion or laminectomy. Physical therapy and chiropractic fees are the average amount paid per visit for all paid physical therapy and chiropractic services.

Table 1 shows the claim and total payment distributions for the primary low back soft tissue diagnoses (ICD-9 codes). Table 2 shows the average benefits paid per claim. Sprain of the lumbar region was the most common low back soft tissue diagnosis, representing 45 percent of the total sample of claims and 48.5 percent of total benefits paid. Diagnoses with non-specific diagnostic descriptions (NOS – Not Otherwise Specified and NEC – Not Elsewhere Classified), including Backache NOS, Sprain of Back NOS, and Sprain, Sacroiliac NOS, made up 16.8 percent of all claims and 18.4 percent of total benefits paid. There was considerable variation in the average paid per claim across the categories, with Backache, NOS costing almost 8 times as much as the lowest cost diagnosis, Sprain of Back, NOS.

1 ICIS is a proprietary transactional database managed by the California Workers' Compensation Institute that contains detailed information on over 2.3 million workplace illnesses and injuries, including employer and employee characteristics, medical service information and benefit and other administrative cost information.

Table 1: Claim and Payment Distributions – Principal Low Back Soft Tissue Diagnoses				
Diagnosis	**# of Claims**	**Total Paid**	**Total Medical**	**Total Indemnity**
Sprain, Lumbar Region	48,247	$ 556,957,923	$ 243,201,662	$ 313,756,261
Sprain, Lumbosacral	31,150	$ 264,160,988	$ 114,174,780	$ 149,986,208
Lumbago	8,567	$ 99,177,204	$ 39,679,566	$ 59,497,638
Sprain, Sacroiliac NOS	6,961	$ 40,764,481	$ 17,474,121	$ 23,290,360
Backache, NOS	5,551	$ 150,500,058	$ 66,576,929	$ 83,923,129
Sprain of Back, NOS	5,540	$ 19,752,673	$ 8,590,304	$ 11,162,369
Sprain of Sacrum	514	$ 7,284,349	$ 3,505,891	$ 3,778,458
Somatic Dysfunction of Lumbar Region	419	$ 5,865,984	$ 2,558,922	$ 3,307,062
Sprain of Coccyx	195	$ 2,622,894	$ 1,076,893	$ 1,546,001
Somatic Dysfunction, Sacral Region	50	$ 533,319	$ 214,298	$ 319,021
Grand Total	**107,194**	**$ 1,147,619,873**	**$ 497,053,366**	**$ 650,566,507**

Table 2: Average Benefit Payments per Claim – Principal Low Back Soft Tissue Diagnoses				
Diagnosis	**# of Claims**	**Avg. Benefit Payments**	**Avg. Medical Payments**	**Avg. Indemnity Payments**
Sprain, Lumbar Region	48,247	$ 11,544	$ 5,041	$ 6,503
Sprain, Lumbosacral	31,150	$ 8,480	$ 3,665	$ 4,815
Lumbago	8,567	$ 11,577	$ 4,632	$ 6,945
Sprain, Sacroiliac NOS	6,961	$ 5,856	$ 2,510	$ 3,346
Backache, NOS	5,551	$ 27,112	$ 11,994	$ 15,119
Sprain of Back, NOS	5,540	$ 3,565	$ 1,551	$ 2,015
Sprain of Sacrum	514	$ 14,172	$ 6,821	$ 7,351
Somatic Dysfunction of Lumbar Region	419	$ 14,000	$ 6,107	$ 7,893
Sprain of Coccyx	195	$ 13,451	$ 5,523	$ 7,928
Somatic Dysfunction, Sacral Region	50	$ 10,666	$ 4,286	$ 6,380
Grand Total	**107,194**	**$ 10,706**	**$ 4,637**	**$ 6,069**

ACOEM Treatment Recommendations: Low Back Soft Tissue Diagnoses

The central finding of ACOEM's most recent review of the literature on the low back pain diagnostic group (ACOEM, 2004, Chapter 12) is that "the strongest evidence regarding potential therapies for low back pain indicates that having the patient return to normal [work and home] activities has the best long-term outcome…the patient should be aware that returning to normal activities [as quickly as possible] most often aids recovery [and prevents debilitation] (p. 288/301)." The ACOEM review noted that many cases of low back pain had no specific cause identified. The review further noted that there is no strong evidence that therapies intended to cure pain are as effective as those focusing on restoring functional abilities. The Guidelines also recommend at-home low stress aerobic exercise, stretching, stabilization and strengthening exercises. Psychosocial, workplace or socioeconomic issues should be addressed in cases of delayed return to function.

Other key findings:

- ❏ While passive and palliative interventions could provide subjective pain relief in the short term, there is a significant risk that treatment dependence without long-term benefit could occur, and evidence of efficacy in high-grade studies is lacking.
  - Manipulation [a passive technique] appears safe and effective in the first few weeks of back pain without radiculopathy.
- ❏ Injection techniques are of questionable merit.
- ❏ Lumbar spine films and imaging are not recommended for this diagnostic group, which excludes patients with neurologic compromise.
- ❏ Patients with low back pain alone rarely benefit from surgery:
  - Surgery increases the need for future surgery, with dramatically higher complication rates.
  - There is no quality evidence that spinal fusion is effective in this diagnostic group.

This study used the ACOEM 2nd edition text to determine the medical treatment recommendations. Table 3 summarizes ACOEM's position on the use of the five medical service areas that were the basis of this study and cites the underlying evidence base – that is, the medical literature that formed the basis of ACOEM's recommendation.

Table 3: Medical Services & ACOEM – Recommended Levels of Use
Low Back Soft Tissue Diagnoses

Medical Service	ACOEM Recommendation	Evidence-Base Cite
Plain Film X-Rays	Limited to red flag assessment.	Bigos et al, 1994; Kendrick et al, 2001; Kerry et al, 2000
CT/MRI	Limited to red flag assessment. Discography and CT Discography are not recommended.	Bigos,1994
Spine Surgery	Surgery is not recommended for: • Patients with back pain alone, no red flags, and no nerve root compression. • Fusion in the absence of fracture, dislocation, complications of tumor or infection.	Bigos et al, 1994; Fritzell et al, 2001 Lee et al, 1995; Gibson et al, 2000 Boult et al, 2000; Gibson et al, 2000 Malter et al, 1996
Physical Therapy	1-2 visits for home exercise program instruction and review. Optional recommendation for relaxation techniques, home application of heat/cold and shoe insoles. Traction, TENS, biofeedback, shoe lifts, and corsets are not recommended.	Bigos, 1994; Furlan et al., 2002 Ghoname et al, 1999; Hagens et al, 2000; Hilde et al, 2002; Hsieh et al, 2002; Jellema et al, 2001; Kovacs et al, 2002; Linz et al, 2002; Schonstein et al, 2003; Urrutia et al, 2002; van der Heijden et al, 1995 van Tulder et al, 1997, 1999, 2000, 2003; Waddell et al, 1997; Zigenfus et al, 2000
Chiropractic Manipulation	Up to 12 manipulations during first month only, if no nerve involvement. Manipulation under anesthesia (MUA) is not recommended.	Cherkin et al, 1998; Haldeman et al, 1993; Mohseni-Bandpei et al, 1998; West et al. 1999

Results

Pre-Reform Utilization of Medical Services

How did pre-reform utilization of the five types of medical services in the claim sample of low back soft tissue problems compare with the ACOEM Guidelines' recommended levels of use? Table 4 shows the number and the proportion of the 107,193 low back soft tissue injury claims in the sample that used each of the five medical services; the mean, median, minimum, and maximum number of visits for each service; and the percentile distributions for the number of visits for each service.

In terms of diagnostic services, almost three in five injured workers with low back soft tissue complaints received plain film x-rays and more than 1 in 6 received CT and/or MRI scans. The distributions of these services were highly skewed, with the 99th percentile for x-rays and CT/MRIs representing 13 and 6 times the median value of the same services, respectively. In addition, the sample included nearly 1,600 workers with low back soft tissue injuries who received one or more spinal fusions or laminectomies.

Physical therapy had the highest level of utilization, with just under 60 percent of the claims in the sample involving at least one physical therapy visit. In addition, 11.8 percent of the claims had at least one visit for chiropractic manipulation. Further analysis showed that 79.1 percent of those injured workers who received these services received levels of physical therapy beyond ACOEM's recommendation, and almost half (48.7 percent) had more than 12 chiropractic visits in the first 30 days, again exceeding ACOEM's recommendation.

Table 4: Medical Treatment Service Utilization for Low Back Soft Tissue Injuries – All Claims

	Plain Film X-Rays	CT/MRI	Surgical Intervention (Fusions & Laminectomies)	Physical Therapy	Chiropractic Manipulation
Number of Claims w/ Specified Treatment	61,597	18,536	1,599	64,156	12,652
Prevalence	57.5%	17.3%	1.5%	59.9%	11.8%
Mean # of Visits	2.11	1.47	1.42	20.63	31.16
Minimum # of Visits	1	1	1	1	1
Maximum # of Visits	64	36	8	862	538
Percentiles:					
10th	1	1	1	1	2
20th	1	1	1	2	3
30th	1	1	1	4	6
40th	1	1	1	5	9
50th (Median)	1	1	1	7	14
60th	1	1	1	10	21
70th	2	1	1	15	32
80th	3	2	2	27	50
90th	4	3	3	56	85
95th	6	3	3	90	120
99th	13	6	4	185	207

Legend:

Number of Claims w/Specified Treatment: The tally of claims receiving at least one service visit within a particular medical service category

Prevalence: The percent of claims with specified treatment (number of claims receiving the service divided into the 107,193 claims in the sample)

Mean: The arithmetic mean of the number of visits received by those claims that involved any of the specified treatment

Minimum: lowest number of visits present among claims that involved any of the specified treatment

Maximum: highest number of visits present among claims that involved any of the specified treatment

Percentiles: a scale derived by placing all claims in order of the number or services received and dividing the sample into 99 equal parts. The 50th percentile, or median, represents the midpoint of the distribution -- the point at which 50 percent of the claim sample had total visits below and 50 percent of the claim sample had total visits above that quantity.

ACOEM's evidence base indicates that in the absence of red flags[2] or spinal nerve root involvement, fusion and laminectomy surgery for low back soft tissue problems is not recommended. Red flags are unlikely in this sample, as the presence of red flags such as fractures, dislocations or spinal cord or nerve root involvement would have caused the claim to be classified in another diagnostic category not included in this analysis. Interestingly, the data (Table 5) show the highest levels of surgery in the non-specific soft tissue categories of Backache, NOS (5.2 percent) and Sprain of Sacrum (3.9 percent).

Table 5: Surgical Rates by Diagnosis Code
Low Back Soft Tissue Complaints

Diagnosis	# of Claims	# of Fusions & Laminectomies	Surgical Rate
Sprain, Lumbar Region	48,247	565	1.2%
Sprain, Lumbosacral	31,150	428	1.4%
Lumbago	8,567	160	1.9%
Sprain, Sacroiliac, NOS	6,961	53	0.8%
Backache, NOS	5,551	289	5.2%
Sprain of Back, NOS	5,540	71	1.3%
Sprain of Sacrum	514	20	3.9%
Somatic Dysfunction of Lumbar Region	419	6	1.4%
Sprain of Coccyx	195	6	3.1%
Somatic Dysfunction Sacral Region	50	1	2.0%

Case-Mix-Adjusted Incremental Effects of Medical Services Within and Above ACOEM's Recommendations

The goal of the regression analyses in this study was to isolate the individual contribution of each of the five types of medical services on a number of key outcomes. To that end, for the five treatment categories included in this study, the authors constructed a series of maximum likelihood regression models. These regression models assessed the association between the independent variables (i.e., the medical services that are the subject of this analysis, as well as a set of other explanatory variables) and the dependent variables (medical and indemnity claim payments, treatment duration and paid time off work as measured by the number of paid TD days). Regression analysis performs a type of case mix adjustment with respect to injured worker and claim characteristics such as demographics (age and sex), occupation, location of injured worker, tenure with employer, etc.[3]

Using the regression models, the study determined the independent effect of each incremental medical visit that exceeded the ACOEM Guideline recommendations, or the presence of a given medical service, after controlling for the impact of the other measurable factors. Researchers then calculated the differences in dollars paid, treatment time (days) and lost time from work, as well as the case-mix-adjusted incremental time and cost amounts for each procedure.

ACOEM recommends limited physical therapy and chiropractic manipulation for soft-tissue back injuries, so the regression models for these two categories included two variables – one to measure the effects of treatment above the recommended level and one to measure the effect of treatment at or below the recommended level. According to the ACOEM Guidelines, x-rays, CTs/MRIs and surgery are rarely indicated for the types of low back soft tissue problems included in this study, so the regression models for these services measured the correlations between the presence of the service and claim payments, treatment duration and length of service. To adjust for case mix, each of the models controlled for employee, employer and injury characteristics, as well as for the presence of the other medical services under review.

The results are presented in Tables 6 and 7. These values represent independent associations between one unit of service and a specific outcome. In other words, the dollar and day values presented represent discrete additional costs and days associated with each service visit for that medical treatment category. To avoid double counting, these values exclude any additional costs or days associated with the

2 For example, red flags for spinal fracture in the patient history include falls from a height or a high-speed vehicle accident. Red flags for spinal fracture in the physical examination include percussion tenderness over specific spinous processes. Historical red flags for tumors of the spine include severe local pain over the spine itself, a history of cancer, pain at rest, and others. ACOEM Occupational Medicine Practice Guidelines, ed.2, p. 289, Table 12-1.

3 The independent (i.e., predictor) variables are listed in the Technical Appendix along with a more detailed description and explanation of conventions and statistical methods.

other four medical service categories in the model. For example, the additional dollars in higher medical costs associated with each x-ray do not include any costs associated with the use of chiropractic, physical therapy, surgery or MRI/CTs. If such services accompanied the x-ray, they would make their own independent contribution to costs and days.

Tables 6 and 7 show the cost and time increases or decreases (savings) associated with each unit of medical service above ACOEM's recommendations for all claims in the sample and for indemnity claims. Overall, incremental medical and indemnity payments, treatment durations, and the number of paid TD days were significantly higher for all medical service categories when utilization exceeded ACOEM-recommended levels for all low back soft tissue injuries.

After controlling for the independent variables, the data in Table 6 show that each plain film x-ray was associated with an additional $912 ($482 dollars of medical costs and $430 in indemnity benefits) compared with the amount paid for a similar claim without the x-ray. The incremental total claim cost among indemnity claims (Table 7) for each plain film x-ray was $2,656. An increase in overall treatment duration was associated with each x-ray: 25.3 days for all claims and 65.4 days for indemnity claims respectively. There also was a significant increase in paid temporary disability days, with each x-ray associated with 1.8 extra days for all claims, and 6.2 extra days for indemnity claims.

Spinal fusions and laminectomies were associated with the largest incremental effects on the dependent variables. According to ACOEM criteria, almost none of these low back soft tissue injury cases should have received these procedures. Among workers who did receive surgery, each surgical encounter was associated with an additional $89,025 in total claim payments. Not surprisingly, each spinal surgery was associated with months of additional medical treatment time and paid time off work (temporary disability) days when compared to similar claims without surgery. For indemnity claims (Table 7), each spinal fusion or laminectomy was associated with two years of additional medical treatment and an additional 7.6 months of TD days.

The results for physical therapy and chiropractic services are of interest because they suggest that modest levels of these services (at or below the recommended levels of treatment suggested by the ACOEM evidence base) are associated with reductions in medical and indemnity costs, as well as reductions in overall treatment duration and temporary disability days. For chiropractic care on all claims in the sample, if the average number of chiropractic service visits was 12 or below, the incremental effect of each visit was associated with a $649 reduction in total claim payments ($175 less in medical benefits and $474 less in indemnity benefits). However, after the 12th visit, each additional chiropractic visit was associated with a $565 increase in total claim payments, 12.7 more days of medical treatment and 0.9 additional days of temporary disability.

Table 6: Service beyond ACOEM Guideline Recommendations (Low Back Soft Tissue Claims - All Claims)

	Additional Medical Paid (or Saved) Per Encounter	Additional Indemnity Paid (or Saved) Per Encounter	Increase (Decrease) In Treatment Days Per Encounter	Increase (Decrease) In Paid TD Days
Plain X-ray Films	$ 482	$ 430	25.3	1.8
CT/MRI	$ 2,876	$ 4,832	174.5	15.7
PT visits <=2	$ 87	$ (44)	4.7	(0.2)
PT visits >2	$ 212	$ 176	8	0.8
Chiropractic visits <=12	$ (175)	$ (474)	(10.2)	(1.7)
Chiropractic visits >12	$ 273	$ 292	12.7	0.9

Table 7: Service beyond ACOEM Guideline Recommendations (Low Back Soft Tissue Claims - Indemnity Claims Only)

	Additional Medical Paid (or Saved) Per Encounter	Additional Indemnity Paid (or Saved) Per Encounter	Increase (Decrease) In Treatment Days Per Encounter	Increase (Decrease) In Paid TD Days
Plain X-ray Films	$ 1,223	$ 1,433	65.4	6.2
CT/MRI	$ 5,956	$13,964	237.4	45.5
Surgery[4]	$ 45,292	$43,733	736.2	229.3
PT visits <=2	$ (9)	$ (177)	(3.9)	(0.7)
PT visits >2	$ 197	$ 278	6.4	1.3
Chiropractic visits <=12	$ (441)	$ (1,178)	(19.2)	(4.2)
Chiropractic visits >12	$ 304	$ 398	10.9	1.2

4 The statistical models for surgery (back fusions and laminectomies) include only indemnity claims.

Table 8: Net Change in Cost & Days at Average Utilization Levels for Medical Services Beyond ACOEM Guideline Recommendations Low Back Soft Tissue Claims (All Claims)

	Average Number of Service Visits	Additional Total Paid (or Saved) Per Claim	Additional Medical Paid (or Saved) Per Claim	Additional Indemnity Paid (or Saved) Per Claim	Increase (Decrease) In Treatment Days Per Claim	Increase (Decrease) In Paid TD Days
PT visits <=2	1.44	$ 62	$ 125	$ (63)	6.77	(0.29)
PT visits >2	25.7	$ 9,972	$ 5,448	$ 4,523	205.60	20.56
Chiropractic visits<=12	4.96	$ (3,219)	$ (868)	$ (2,351)	(50.59)	(8.43)
Chiropractic visits>12	50.82	$ 28,713	$ 13,874	$ 14,839	645.41	45.74

Table 8 applies the incremental cost and time findings to the mean number of visits for physical therapy and chiropractic care. Note that the average number of visits for physical therapy and chiropractic have been prepared separately for claims below or equal to the ACOEM-recommended levels. For example, claims with chiropractic treatment at or below ACOEM-recommended targets of up to 12 visits involved an average of 4.96 visits per claim, while claims with chiropractic treatment above the ACOEM target averaged 50.82 visits. Here, the results show a significant reduction in medical treatment costs for claims with treatment levels that conform to ACOEM recommendations — an average of $3,219 less than similar claims that involve no chiropractic care. Once the number of chiropractic visits exceeds the ACOEM target, however, the average total claim cost increases by $28,713. For all claims, physical therapy has a net increase in medical cost for both treatment levels over and under the ACOEM target, but for indemnity claims (Table 7) treatment levels under the ACOEM target were associated with net savings. (The values in dollars and days for treatment levels under the physical therapy ACOEM target were not statistically significant.)

Discussion

This study found that for the treatment of low back soft tissue injuries, utilization of medical services beyond the ACOEM-recommended levels was strongly associated with higher total claim (medical and indemnity) costs, prolonged medical treatment, and delayed return-to-work (greater number of paid TD days). Put another way, the study found a negative association between medical treatment that exceeded the ACOEM Guideline targets and any sort of measurable value to the injured worker or employer in terms of a quicker recovery or faster return to work. The study also found that modest levels of physical therapy and chiropractic care – within ACOEM-recommended levels – were, in fact, associated with value, in the form of lower medical and indemnity payments as well as fewer paid TD days among certain subsets of indemnity claims.

These results should not be interpreted as evidence for a zero-tolerance policy regarding potential exceptions that might be needed to the ACOEM Guidelines' suggested targets. As noted earlier, guidelines such as ACOEM's usually include a caveat that an individual patient's needs should be taken into account when developing a plan of treatment -- and in the case of workers' compensation claims, management of functional recovery also must be considered. At the same time, the guidelines should not be ignored simply because some stakeholders argue that they are too rigid to account for individual patient differences. A reasonable middle ground would be to form differing treatment plans for individuals only for "compelling" reasons, to closely correlate treatment with measurable recovery, and to try to avoid the wide variations in care that have led to wide variations in medical outcomes.

Critics of the ACOEM Guidelines have noted that the Guidelines' suggested levels of treatment were developed mainly through systematic reviews of the medical literature. The gold standard of evidence-based medicine is the randomized controlled clinical trial (RCT), which is the best available approach to reducing bias in research studies. RCTs are not always feasible, however, and they have been criticized as being somewhat artificial or too rigorous compared to actual practice. Also, RCTs may be limited to specific population groups rather than encompassing a full spectrum of age, gender, income and ethnic groups. The ACOEM Guidelines did not have a large number of high-quality RCTs to draw on, either because they had not been performed, or because they may not have addressed outcomes such as the cost-effectiveness of care or its impact on return to work. ACOEM does cite retrospective cohort studies (such as the present study) that use different methods to demonstrate better outcomes. This line of evidence reinforces the effectiveness of the Guideline's recommendations.

Controlling for clinical severity can be a challenge. There were limited severity variables in the administrative data used in this analysis. Consistency and accuracy of diagnostic codes and the lack of severity measures in administrative data are issues that have been discussed in prior studies (Harris 2004, Gardner, 2002). The authors attempted to mitigate these issues by restricting the claim sample to the more homogeneous category of low back soft tissue complaints without spinal cord or neurological involvement. And while this study found strong correlations between medical services beyond the ACOEM Guidelines and higher costs and increases in paid TD days for this diagnostic subset, the authors caution against the tendency to generalize these findings to the entire population of injured workers. Additional research for other diagnostic categories is clearly needed. Also, it is always important to remember that statistical models suggest associations rather than cause and effect relationships.

The authors also regret the lack of available patient satisfaction data for this analysis. It is conceivable that additional levels of medical treatment beyond the ACOEM Guidelines' targets convey psychological benefits or other non-monetary value to the injured worker.

Despite these limitations, the findings from this study have implications and applications for many system stakeholders.

Injured Workers

The most important stakeholder, of course, is the injured worker who seeks relief and recovery from work-related injuries. Recent reforms have made significant changes in how injured workers select their providers, as well as in how payment decisions are made. A growing number of California injured workers are selecting providers from medical provider networks. Regardless of the physician's medical network affiliation, all medical treatment decisions are now subject to comparisons to the ACOEM Guidelines to verify the effectiveness and clinical value of the medical service to the injured worker and the appropriateness of payment for those services.

Selecting a provider and evaluating medical treatment plans requires access to information. The health care literature suggests that individuals want more information about their choice of physician, their health status and conditions, and their treatment options, risks and prognosis. In addition, they want to share in the decision-making about their care (Degner 1988; Deber 1996; Mazur 1997; Guadagnoli 1998; Mansell 2000). Furthermore, the literature increasingly shows that patients who are actively involved in decision making about their care have better outcomes, are more satisfied with their care and incur lower costs than those who are not (Stewart 1995; Superio-Cabuslay 1996; Gifford 1998; Von Korff 1998; Lorig 1999).

The literature also suggests, however, that consumers do not use information, even when it is provided to them (Hibbard 2002). Studies from the late 1990s found that consumers did not use comparative reports to make health plan choices (Hibbard 1997; Chernew 1998; Knutson 1998), while more recent research found that patients did not use this type of information to choose providers and provider organizations (Abraham 2004). The reasons that consumers do not use the available information are not clear. It has been suggested that non-constant rating methods and rating inconsistencies lead to confusion (Scanlon 1998) and that consumers don't understand the health care context well enough to understand the information provided in quality report cards (Hibbard 1997). Given consumers' desire for quality information, and their inability or unwillingness to use the information available, current research is focused on making the information more accessible and useful (Sainfort 1996; McGee 1999; Hibbard 2002; Kanouse 2004).

Employers and Payors

SB899 provides employers with new incentives to utilize payors' managed medical networks and utilization review (UR) programs on behalf of their injured employees. While networks and UR are not new, the expectations for networks and UR to control costs and improve the quality of care have never been higher. Recent research has examined the challenges of integrating ACOEM guidelines into a UR process (Harris 2005). With the advent of the recent reforms, California workers' compensation payors will now have the ability to evaluate their networks by comparing medical utilization against guidelines rather than just by assessing unadjusted costs or fee schedule discounts. The payors and their managed provider networks, however, now face the challenge of using the medical evidence to reduce the unnecessary and unproven medical care that plagued the system and drove up costs in the past, while avoiding unacceptable levels of friction between injured workers and their physicians. Given the reductions in utilization warranted by evidence-based medicine, it is unrealistic to expect complete agreement between payor and provider during the initial implementation of the SB899 reforms.

Providers and Networks

Providers who diagnose and treat injured workers in California may need education in the process, the application and the content of evidence-based medicine, particularly for musculoskeletal complaints. The current level of utilization of apparently ineffective testing and treatment suggests a need to review the evidence of effectiveness of those services.

A recent study found that most providers treating California injured workers have low levels of experience managing workers' compensation claims (Swedlow 2003). Subsequent to that research and the enactment of SB 899, the Division of Workers' Compensation reported more than 800 applications from payors to use managed provider networks. Clearly, payors are looking to their networks as never before to reduce unproven treatment and raise the quality of care to injured employees. One of the most crucial tasks for the networks will be to inform and educate their physicians about the new emphasis on evidence-based medical guidelines, and to provide systematically developed statements to assist medical providers and patients in making appropriate health care decisions that suit their specific circumstances (Institute of Medicine, 1990). Properly developed guidelines that assess and distill the research evidence will provide essential assistance to busy or less experienced clinicians looking to apply the current standard of care.

Legislators and Regulators

In the last three years, California legislators and regulators have ushered in some of the most significant workers' compensation changes in the state's history. While the laws have been passed and implementation is underway, as of this writing, the state is still developing many of the detailed rules and regulations that will make the reform laws operate in the real world. Added to that difficult task is the diversity of opinion among the various stakeholders, and the demands of many to amend and/or repeal the recently enacted reforms for all manner of reasons. One of the most important issues under discussion is how to expand the medical evidence base used by the California workers' compensation system to define medically appropriate treatment. The Administrative Director of the Division of Workers' Compensation is considering the use of a panel of experts to determine the best method to reassess and perhaps expand the evidence base without compromising the standard of care set by ACOEM.

There is no doubt that future research into the short- and long-term impact of evidence-based medicine and medical networks will play an important role in monitoring the effects of the recent reforms, while illuminating areas for additional changes.

Technical Notes

Regression Overview

Researchers use regression analysis to quantify the extent and statistical significance of the relationships between outcome (dependent) variables and predictor (independent) variables such as age, sex, location, diagnosis group, etc. Regression methodology isolates the independent effect that each predictor variable has on the outcome variable by controlling for the effects of the other predictor variables. Analysts can model categorical predictor variables by contrasting all but one of the categories of a variable with the remaining category, which is known as the "excluded" category. For each category, the researchers can calculate a "parameter estimate," which is the average difference in the outcome variable (e.g., cost) compared with the excluded category. Thus, regression analysis is able to adjust for case mix and other factors that may have an independent effect on the variable being measured, allowing researchers to account for any inherent differences among the claims that would otherwise bias the results of the analyses.

The main goal of this evaluation was to measure the correlations between medical utilization that does not conform to the ACOEM guidelines and average treatment payments, TD days and treatment duration. As described previously, the authors limited this analysis to a specific set of low back soft tissue diagnoses. The regression models developed for this evaluation contained five categories of independent variables:

1. Utilization variables
2. Indemnity and litigation status
3. Demographic variables
4. Policy-level variables
5. Industry

This study modeled all of the independent variables except for chiropractic and physical therapy utilization as categorical variables. The large number of observations available in the data set made it possible to include many categories for each variable. The main variables of interest, however, were the utilization variables. The ACOEM Guidelines recommend limited levels of chiropractic care and physical therapy, so for these utilization variables, the study constructed separate continuous variables to assess the effect of being under or over those targets. The study classified the other utilization variables -- those not recommended at any level in the treatment of the specific diagnoses by the ACOEM Guidelines -- into “any use” versus “no use” categories (i.e., any MRI, any surgery and any x-ray use).

The dependent variables included total claim payments, total medical payments, total indemnity payments, temporary disability (TD) days and treatment duration. Except for the regressions of total indemnity paid and TD days, the study ran two analyses for each independent variable; one for all claims and one for indemnity claims only. Regressions of total indemnity paid and TD days were run among indemnity claims only. All of the regressions were run on claims with dates of injury between January 1, 1997 and December 31, 2002. The regressions used maximum likelihood estimation to control for the presence of open claims.

Regression Results

The following section describes the regression results, focusing on the impact of the various utilization measures. A detailed table showing all of the correlations between each utilization measure and payments, TD days and treatment duration, is posted in the Policy Issues section of the Newsroom on the Institute’s website (www.cwci.org).

Effect of Below-Limit and Above-Limit Chiropractic Utilization

The first set of regressions focused on the correlations between below-limit and above-limit chiropractic utilization and total claim costs, total medical costs, total indemnity costs, TD days and treatment duration. For these regressions, other utilization measures, including physical therapy, were modeled as “any” vs. “none.” The results show that after controlling for all other factors there was a net decrease in costs, TD days and treatment duration for each visit that occurred below the ACOEM Guidelines’ limit, and a net increase in costs for each visit that occurred above the ACOEM limit. These results occurred both when the regressions were run for all claims and when they were run for indemnity claims only.

Effect of Below-Limit and Above-Limit Physical Therapy Utilization

The second set of regressions focused on the correlations between below-limit and above-limit physical therapy utilization and total claim costs, total medical costs, total indemnity costs, TD days and treatment duration. Again, other utilization measures, including chiropractic services, were modeled as “any” vs. “none.” The results for the entire claim sample (medical-only and indemnity claims) showed that after controlling for all other factors, there was a net increase in costs for each visit that occurred below the ACOEM Guidelines’ limit, as well as a net increase in costs for each visit that occurred above the ACOEM limit. However, when the regressions were run among indemnity claims only, after controlling for all other factors, there was a net decrease in costs for each visit that occurred below the ACOEM Guidelines’ limit, and a net increase in costs for each visit above the ACOEM limit. (The decrease in medical costs for physical therapy visits among indemnity claims was the only result that was not statistically significant.)

Effect of Below-Limit and Above-Limit Use of MRI, Surgery and X-rays

Both sets of regression analyses found similar correlations between CT/MRI, surgery and x-ray utilization and total claim costs, total medical costs, total indemnity costs, TD days and treatment duration. In each regression, the researchers modeled the utilization measures as "any" vs. "none," and after controlling for all other factors, each analysis noted a net increase in costs when there was any utilization of CT/MRI, surgery[5] or x-ray services. These results occurred both when the regressions were run among all claims and when they were run only among indemnity claims.

To summarize, the regression results showed a correlation between below-target utilization of chiropractic services and favorable results -- decreases in costs, TD days and treatment duration; and a correlation between above-target utilization of chiropractic services and increases in costs, TD days and treatment duration. For all claims, the regressions found both below-limit and above-limit utilization of physical therapy services were associated with increased costs, TD days and treatment duration. When the analyses were limited to just indemnity claims, however, after controlling for all other factors, there was a statistically insignificant decrease in costs for each visit below the ACOEM targeted level for both chiropractic and physical therapy services, but a statistically significant net increase in costs for each visit above the ACOEM target. Finally, the use of MRIs, surgery and x-rays were each associated with statistically significant and substantial increases in costs, both among all claims and among indemnity claims only.

The Institute has posted a subset of tables summarizing the results of the regression models for each of the utilization measures, as well as exhibits showing parameter estimates and significance levels of key variables used in the regression models in the Policy Issues section of the Newsroom at www.cwci.org.

Acknowledgments

The authors wish to acknowledge several subject matter experts who contributed suggestions on a variety of academic, public policy, legislative and industry issues central to this report. In particular, we wish to thank Elizabeth Genovese, MD, and Kathryn Mueller, MD, for providing feedback and interpretation on the ACOEM guidelines. We also thank Michael Helvacian for providing initial conceptual suggestions for the statistical models, and Dr. Patsi Sinnott for her insights on patient consumer use of health care quality and physician information.

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About CWCI

The California Workers' Compensation Institute, incorporated in 1964, is a private, nonprofit organization of insurers and self-insured employers conducting and communicating research and analyses to improve the California workers' compensation system. Most CWCI research is based on operating data collected from member companies specifically for the Institute.

CWCI Research Notes is published by the California Workers' Compensation Institute, 1111 Broadway, Suite 2350, Oakland, CA 94607; (510) 251-9470; www.cwci.org.