A REPORT TO THE INDUSTRY

Evidence-Based Medicine & The California Workers' Compensation System

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Introduction

In September 2003, former California Governor Gray Davis signed legislation (SB 228), hailed by state lawmakers as a significant first step in controlling the soaring cost of the state's $25 billion per year workers' compensation program. According to the California Workers' Compensation Insurance Rating Bureau, the average ultimate medical cost per indemnity claim in California more than tripled from $8,557 in 1992 to $27,551 in 2002, so much of the focus of the 2003 legislation was on containing medical utilization and cost without sacrificing quality of care. The reforms mandated that by December 2004, the state adopt workers' compensation medical treatment utilization guidelines that incorporate evidence-based, peer-reviewed, nationally recognized standards of medical care. Furthermore, the reforms gave the presumption of correctness to the medical treatment utilization guidelines over the issues of the extent and scope of treatment.

This Report to the Industry summarizes findings from a comprehensive Institute analysis of evidence-based medicine, released in January 2004, and available online in the Policy Issues section of News Room on the Institute's website at www.cwci.org. The analysis provides a fundamental understanding of how evidence-based medicine evolved, what it entails, and how evidence-based expected levels of testing and treatment compare with actual levels of medical utilization in the current California workers' compensation system.

California Workers' Compensation Institute

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About CWCI

The California Workers' Compensation Institute, incorporated in 1964, is a private, non-profit organization of insurers and self-insured employers conducting and communicating research and analyses to improve the California workers' compensation system.

Evidence-Based Medicine &
The California Workers' Compensation System

PART I:
What Is Evidence-Based Medicine?

Evidence-based medicine (EBM) uses analyses and summaries of scientific studies to:

1. guide effective clinical decision-making;
2. ensure the consistent use of proven medical practices; and
3. reduce unproven, ineffective care.

EBM has produced a different style of medical practice based on knowledge and application of medical literature underlying each clinical decision rather than reliance on anecdote or personal experience.

History of EBM

Evidence-based medicine emerged as a formal method of clinical decision making more than 30 years ago. Sir Archie Cochrane, an epidemiologist in Great Britain, is regarded as one of the fathers of EBM. His 1972 book, Effectiveness and Efficiency: Random Reflections on Health Services, drew attention to the lack of reliable reviews of the available evidence for medical decision-making. Beginning in the 1970s, John Bunker at Harvard University and others published a series of studies demonstrating wide variation in the use of resources for care of similar health problems among small and large geographic areas (Bunker 1970, Wennberg 1973, McPherson 1982, Wennberg 1985, Wennberg 2001).

Donald Berwick, the CEO of the Institute for Healthcare Improvement (formerly of Harvard Community Health Plan), pointed out that this degree of variance amounts to a roll of the dice in making health care decisions (Berwick 1990). Earlier research noted that random treatment strategies create random outcomes, a situation that does not inspire confidence in medical care (Bunker 1982). EBM can identify and provide an understanding of the most effective and efficient practices within the landscape of variation in care (Wennberg, 1991).

In the early 1980's, the Canadian Medical Association Journal published a series that advised clinicians on how to apply the basic rules of evidence to articles in medical journals. The authors, led by David Sackett, a clinical epidemiologist, proposed the term "critical appraisal" for this process. Sackett later realized the need to apply high-grade evidence to solving practical patient problems. He called this process "bringing critical appraisal to the bedside." Gordon Guyatt at McMaster University coined the term "Evidence-Based Medicine" in 1991 to describe this more effective method of medical practice (Guyatt 2002). From 1989 to 1991, David Eddy published a series of papers about the appropriate use of the medical literature in the Journal of the American Medical Association (Eddy 1990a, b, 1991, 1996). These articles were used as basic materials in a variety of effective quality improvement efforts at Harvard Community Health Plan, Kaiser Permanente, and elsewhere.

Federal legislation enacted by Congress 15 years ago laid the groundwork for further acceptance and expansion of evidence-based medicine. In 1989, the Omnibus Budget Reconciliation Act (OBRA 89) created the Agency for Healthcare Policy and Research (AHCPR), in part to improve the scope and understanding of what works and what does not work in medical care (Field and Lohr, 1990; Field and Lohr, 1992).

EBM Tools and Process

The process of "bringing critical appraisal to the bedside" begins with an evidence search. Evidence-based medicine starts with systematic reviews of the medical literature, placing emphasis on high-grade evidence such as randomized controlled trials (see below). After reviewing the literature, the researchers produce evidence summaries, ranking the evidence in order of quality. The quality of studies is rated as follows, in descending order:

- **Randomized controlled trials:** studies in which patients are randomly assigned to treatment and control groups are regarded as the highest-grade evidence.
- **Prospective cohort studies:** forward observations of groups of patients over time and comparison of characteristics and treatments.
- **Retrospective cohort studies:** similar studies looking back at previously collected data.

- **Case-control studies:** matching people with a health problem to other people with similar characteristics, but without the health problem, are regarded as less accurate.

Anecdotal observations: a group of cases with no match or control group or reports of individual cases are not regarded as high-grade evidence.

After reviewing the summaries and rating the quality of the evidence, a multi-disciplinary group of physicians and researchers applies clinical judgment and logic to formulate recommendations for practice, or practice guidelines. A final step in guideline development is acceptance testing. Examples include the guidelines developed by the Agency for Health Care Research and Quality (AHRQ) and those developed by the American College of Occupational and Environmental Medicine (ACOEM),[1] both of which have been subjected to "bench" and clinical testing to ensure that they are reasonable, practical and acceptable to clinicians and patients.

EBM in Occupational Medicine and Workers' Compensation

Workers' compensation is a complex system with many parties contributing to medical decisions. Physicians make the initial decisions about testing, treatment and disability management. However, employers, insurance adjusters, nurse case managers, utilization review physicians, attorneys and administrative law judges also make decisions that influence compensibility of an injury, worker safety, injury rates, return to work, pay for care and pay for absence from work. Presently, these groups often use standards or logic that are not based on evidence of effectiveness of medical treatment, but on traditional insurance industry practices, perceptions of regulations, legal precedent, threats of legal actions, and physician statements made without supporting scientific evidence (Harris 2003). This complexity not only increases variation in treatment effectiveness, medical utilization, and cost, it also affects administration and enforcement decisions within the workers' compensation system. In order to deliver high quality care within a cost-efficient system, all groups should be working from the same scientific evidence base to ensure consistency across all aspects of medical quality.

PART II: EBM in Occupational Medicine and Workers' Compensation: Comparing Actual Utilization Patterns to EBM Criteria

This section of the report applies the ACOEM guidelines and evidence base to a large sample of California workers' compensation claims. The objectives are to:

- Match workers' compensation health complaints to ACOEM guidelines.
- Measure the distribution of claims and benefits that are addressed by the ACOEM guidelines.
- Identify injuries and illnesses not addressed by ACOEM guidelines.
- Compare actual to ACOEM-expected levels for low-back complaints for selected medical testing, services and benefits including:
    1. Plain Film X-rays
    2. CAT Scans and MRIs
    3. Physical Medicine
    4. Chiropractic Care
    5. Surgical Intervention (Fusions & Laminectomies)
    6. Temporary Disability

Data

The Institute compiled data on injured workers, medical services, and benefit payments from its Industry Claim Information System (ICIS).[2] The sample is comprised of open and closed claims with dates of injury between January 1, 1997 and December 2000, with all benefit payments made through June 30, 2002.

This study used more than 1 million claims reflecting $8.6 billion in workers' compensation benefit payments. That total included $4.1 billion in medical benefits (48 percent of the total, including outpatient and inpatient services, but excluding medical legal and medical cost containment charges); and $4.5 billion in indemnity benefits (52 percent of the total, including temporary disability, permanent disability, and other indemnity payments).

1 Harris, 1997.

2 ICIS is a proprietary database maintained by the California Workers' Compensation Institute that contains detailed information, including employer and employee characteristics, medical service information, and benefit and other administrative cost information on over 2.5 million workplace injuries.

Results

The distribution of injured workers by gender, average age, employee tenure (the elapsed time between date of hire and injury date) and claim type (medical-only injuries and indemnity claims with lost time from work) was consistent with prior CWCI studies and other research and observations.

Table 1. Distribution of Claims by Claim Type–Dollars Paid

Claim Type	Claims	Total	Medical	Indemnity
Indemnity	361,242	$ 8.132 billion	$ 3.619 billion	$ 4.514 billion
Med-Only	665,354	$ .434 billion	$ .434 billion	
Total	1,026,596	$ 8.567 billion	$ 4.053 billion	$ 4.514 billion

Table 1 gives a breakdown of indemnity and medical-only cases in the claim sample used in this analysis. The sample conforms with expected levels of medical-only and indemnity claims and benefit payments documented in other studies (Gardner 2002, Swedlow 2003). Medical-only claims, for which no lost time benefits are paid to injured workers, make up two-thirds of all claims, but only 5 percent of total benefit payments.

ACOEM Guideline Categories: Claim Incidence and Benefits Paid

To measure the effect of applying the ACOEM recommendations to the sample of claims, the primary diagnosis code[3] for each claim was mapped into one of 16 diagnostic groups. These groups pool ICD-9 diagnosis codes with treatment patterns that are expected to be similar according to the evidence base. Claim distributions and average payments for the 16 diagnostic groups are shown in Table 2.

The ACOEM guideline evidence base covers common and variably treated complaints for most musculoskeletal areas, including the neck and upper back, the shoulder, the elbow, the forearm, wrist and hand, low back, knee, ankle and foot, eye, as well as occupational stress. Areas not explicitly addressed by the guidelines include injuries for which there is little variation in treatment, such as contusions, lacerations, burns; ill-defined injuries and illnesses; and some body areas with a low incidence of occupational complaints, such as the hip. Low back – soft tissue complaints make up the

Table 2. Distribution of Claims and Average Payments by Diagnostic Group

ACOEM Categories	Claims	Average Paid	Average Medical	Average Indemnity
Low Back - Soft Tissue Complaints	168,885	$ 9,366	$ 4,120	$ 5,246
Neck - Soft Tissue Complaints	47,958	$ 9,880	$ 4,583	$ 5,297
Shoulder - Soft Tissue Complaints	46,259	$ 8,499	$ 4,033	$ 4,466
Other ACOEM Categories	28,001	$ 13,477	$ 6,233	$ 7,244
Low Back - Spinal Degeneration	6,514	$ 49,661	$ 22,191	$ 27,470
Forearm, Wrist and Hand - Soft Tissue Complaints	63,921	$ 5,051	$ 2,398	$ 2,653
Forearm, Wrist and Hand - Nerve Compression	14,464	$ 21,715	$ 8,603	$ 13,111
Low Back – Nerve Involvement	10,416	$ 26,876	$ 11,325	$ 15,551
Knee - Soft Tissue Complaints	30,172	$ 8,194	$ 3,744	$ 4,450
Ankle, Foot - Soft Tissue Complaints	46,641	$ 4,119	$ 1,864	$ 2,256
Elbow - Soft Tissue Complaints	19,453	$ 7,777	$ 3,454	$ 4,323
Knee - Internal Derangement	6,201	$ 22,194	$ 10,165	$ 12,029
Neck – Nerve Root Compression	3,785	$ 27,955	$ 12,648	$ 15,307
Shoulder - Impingement Syndrome	1,692	$ 8,745	$ 3,942	$ 4,803
Shoulder - Complex Soft Tissue Trauma	455	$ 22,136	$ 10,370	$ 11,767
Knee - Ligament Tear	426	$ 23,348	$ 11,850	$ 11,498
Non-ACOEM Categories				
Non-Specific Claims	309,773	$ 8,582	$ 4,258	$ 4,324
Trauma	221,580	$ 4,392	$ 2,359	$ 2,033
Total	**1,026,596**	**$ 8,345**	**$ 3,948**	**$ 4,397**

3 The ICIS database system uses a proprietary algorithm to determine the primary diagnosis code for each injury. The algorithm and grouping system were developed for ICIS data by Swedlow and Gardner and have been previously described in several studies including Smithline 1990, Swedlow 2002, and Gardner 2002.

largest category of health problems in the data sample, accounting for one out of six claims and more than one out of every five benefit dollars paid. Categories with peripheral nerve or spinal nerve root impingement and spinal degeneration have some of the highest average costs in the California workers' compensation system, so they consume a disproportionately high share of total benefit payments relative to their frequency.

In fact, Table 2 shows that overall, low back - spinal degeneration claims have the highest average benefit payments per claim, six times the average for all claims. Claims involving ankle, foot - soft tissue complaints have the lowest average cost, 49 percent of the overall average cost per claim.

The two diagnostic categories at the bottom of Table 2, non-specific and trauma claims, are comprised of injury and illness codes that fall outside of the ACOEM guidelines. (Trauma claims include fractures, burns, and lacerations.)[4]

Taken together, non-specific diagnosis claims, involving conditions for which there are no ACOEM guidelines, make up more than half (51.7 percent) of all California workers' compensation claims and 42.3 percent of total benefit costs.

Health Complaints for Non-Specific Injuries Outside the ACOEM Guidelines

Table 3 gives detailed information on claim and payment distributions for the primary diagnosis codes for non-specific claims.

These distributions reveal significant issues related to evidence-based medicine and physician assessment. A significant proportion of these claims and payments were assigned primary diagnosis codes for ill-defined or vague health problems. Many codes contain NEC, or "not elsewhere classified," and NOC, or "not otherwise classified," clinical descriptors used when symptoms and signs are

Table 3. Percent of Claims and Total Payments for Top 20 Principle Diagnosis Codes: Non-Specific Diagnostic Group Claims

Principle Diagnosis Codes:	Claims	Total Paid	Total Medical	Total Indemnity
95990 – Injury –Site NOS	15.2%	14.8%	14.1%	15.6%
95980 – Injury Multiple Site/Site NEC	12.0%	18.1%	17.2%	19.0%
7998 - Ill-Defined Condition NEC	4.9%	6.9%	5.9%	7.9%
71946 – Joint Pain-Lower Leg	1.7%	2.9%	2.7%	3.1%
959 - Injury NEC/NOS	1.6%	2.4%	2.4%	2.4%
95910 – Trunk Injury NOS	1.6%	3.8%	3.8%	3.8%
95970 – Lower Leg Injury NOS	1.2%	2.7%	2.5%	2.8%
7295 - Pain In Limb	1.0%	1.1%	1.0%	1.1%
8488 – Sprain NEC	1.0%	0.3%	0.3%	0.3%
7262 - Shoulder Region Dislocation NEC	0.8%	3.2%	3.1%	3.3%
9597 – Lower Leg Injury NOS	0.8%	1.2%	1.2%	1.3%
9595 – Finger Injury NOS	0.7%	0.4%	0.4%	0.3%
72709 – Synovitis NEC	0.5%	0.4%	0.4%	0.5%
7291 - Myalgia and Myositis NOS	0.5%	0.6%	0.5%	0.6%
78650 - Chest Pain NOS	0.5%	0.4%	0.4%	0.3%
9594 - Hand Injury NOS	0.5%	0.4%	0.4%	0.4%
7222 – Disc Displacement NOS	0.4%	1.7%	1.5%	2.0%
7840 – Headache	0.4%	0.5%	0.4%	0.5%
9593 – Elbow/Forearm/Wrist Injury NOS	0.4%	0.4%	0.4%	0.5%
85400 – Brain Injury NEC	0.3%	0.7%	1.0%	0.4%
Percent of All Non-Specific Codes	**46.0%**	**62.9%**	**59.6%**	**66.1%**

4 Trauma injuries were not expressly developed for the ACOEM guidelines due to more well defined treatment pathways and anecdotal studies of less treatment variability. Treatment variability for trauma injury will be the focus of additional study by the authors in a subsequent study.

either vaguely diagnosed by the treating physician, inappropriately coded by the physician's billing office, or not fully articulated by the injured worker. The top three diagnostic codes in Table 3, 95990 - Injury-Site NOS, 95980 - Injury Multiple Site NEC, and 7998 – Ill-Defined Condition NEC, are among the most frequent and most vague diagnoses found in all of workers' compensation, and are disproportionately expensive compared to their frequency. Guideline recommendations are always linked to a diagnosis, since scientific studies are performed on specific health problems. It is not possible to medically manage such a case without a clear diagnosis. As a corollary, lack of a clear medical diagnosis makes issues of treatment and compensability difficult to resolve.

Low Back Injury: Comparing Actual & ACOEM-Expected Levels of Medical Testing and Service Utilization

The balance of the analysis in this section of the report will focus on two of the most common diagnostic categories found in workers' compensation: low back - soft tissue complaints and low back – nerve involvement.[5]

Low back complaints are virtually all soft tissue complaints or nerve involvement, and the ratio of these diagnostic groups vary by state. In the California workers' compensation system, these two health problems combined account for almost 18 percent of all claims and 22 percent of total benefits.

Utilization Tables: The following tables summarize the overall use of specific tests or procedures throughout the life of all claims in the low back/soft tissue and low back/nerve involvement categories. There are separate tables for X-rays; MRIs/CT scans; physical medicine; chiropractic manipulation; laminectomies/spinal fusions; and temporary disability. Each table shows four different measures of utilization:

- Total Claims: The sum of all claims (medical-only and indemnity) and indemnity claims within the specific low back diagnostic category.
- Claims with Medical Resource: The subset of claims within the total claim count that have any presence of the particular medical service (e.g. x-rays or physical medicine).
- Percent of Claim Pool: The proportion of claims within the diagnostic category that have received that particular medical service (Claims with Medical Resource/Total Claims).
- Utilization (Mean and Median): The mean and median (midpoint, or 50th percentile in the overall distribution) number of visits for a particular medical test or procedure.

Plain Film X-Rays

Among the 168,885 low back soft tissue cases in the study sample, more than half (56.2 percent) had X-rays taken (Table 4), and within the subset of 74,343 indemnity claims, 70 percent had X-rays. All together, these low back soft tissue cases accounted for 199,391 X-ray visits, averaging 2.1 visits per claim overall (including medical onlys), with an average of 2.7 visits for each indemnity claim in the sample. The median number of X-ray visits was 1 across all low-back soft-tissue injuries, and among indemnity claims for this type of injury, the median was 2.

Table 4. Overall Utilization: X-Rays

	Low Back – Soft Tissue Complaints		Low Back – Nerve Involvement	
	All Claims	Indemnity Claims	All Claims	Indemnity Claims
Total Claims	168,885	74,343	10,416	7,601
Claims w/ Medical Resource	94,948	52,161	7,786	6,221
Percent of Claim Pool	56.2%	70.2%	74.8%	81.8%
Utilization				
Mean (Avg. # of visits)	2.1	2.7	2.9	3.2
Median # of visits (50th percentile)	1	2	2	2

Table 4 also shows that X-rays were heavily used in cases in which the diagnosis was a low back problem with nerve involvement. Among the 10,416 claims with this diagnosis, nearly three out of four involved X-rays. These cases generated a total of 22,581 X-ray visits, which translates to an average of 2.9 visits, with a median of 2 visits for all of the low back nerve involvement cases. Eighty-eight percent of these X-ray film procedures (6,221 cases) were for indemnity claims, which averaged 3.2 X-ray visits per case, while the median for indemnity claims also was 2 visits.

5 The third low back category, Low Back – Spinal Degeneration, was not included due to the lack of sufficient high-grade evidence to support its relation to occupational injury. In addition, the prevalence of asymptomatic disk and spine degeneration in the general population as it ages is quite high, making the association between symptoms and imaging findings unreliable.

According to ACOEM guidelines, X-rays for both categories of low back health problems are not recommended in most cases because strains and nonspecific pain as well as nerve roots, the sciatic nerve and the spinal cord cannot be visualized on plain films with enough detail to be clinically useful. The ACOEM evidence base contains exceptions for suspicions of red flags[6] for back injuries and other problems including fractures, infections, tumors, or extra-spinal pathologies, however, such problems would fall outside of both the soft tissue and nerve involvement categories. Therefore, the ACOEM guidelines would have recommended a very small percentage of the total number of X-rays for both low back soft tissue and nerve involvement categories.

Computer Axial Tomography (CT) Scans & Magnetic Resonance Imaging (MRI)

The claim sample found that 26,789 cases, or just under 16 percent of all claimants diagnosed with low back soft tissue complaints received MRIs or CT scans. Indemnity claims accounted for 96 percent of these MRI and CT scan procedures. Among claimants with low back soft tissue complaints resulting in lost time, one in three received an MRI or CT scan. The average number of visits for MRIs or CT scans was 1.6 – both overall and for indemnity claims, and the median number of visits was 1.

Table 5. Overall Utilization: CT/MRI

	Low Back – Soft Tissue Complaints		Low Back – Nerve Involvement	
	All Claims	Indemnity Claims	All Claims	Indemnity Claims
Total Claims	168,885	74,343	10,416	7,601
Claims w/ Medical Resource	26,789	25,757	4,760	4,309
Percent of Claim Pool	15.9%	34.6%	45.7%	56.7%
Utilization				
Mean (Avg. # of visits)	**1.6**	**1.6**	**2.4**	**2.6**
Median # of visits (50th percentile)	1	1	1	1

In addition, the study found 11,203 MRIs and CT scans were performed on 10,416 injured workers with diagnoses of nerve involvement, 97 percent of which were done on injured workers with indemnity cases. Almost 46 percent of all claimants diagnosed with low back conditions with nerve involvement had MRIs or CT scans, and the rate among indemnity cases was nearly 57 percent. Claimants in this diagnostic group averaged about 2-1/2 MRI/CT visits, with a median of 1 visit.

The ACOEM guidelines evidence base recommends imaging (MRI, CT scan, etc.) be used to confirm clinical findings and clarify the anatomy prior to surgery for conditions proven to benefit from surgery in the short and long terms with an acceptable benefit-to-risk ratio. If surgery is not contemplated, imaging will not affect the course of treatment[7], so it should not be pursued. As noted later in this report, the surgical rate (assuming all surgeries were justified -- an unlikely assumption) for disk displacement and stenosis cases equaled 9.6 percent (see Table 10), so in nerve involvement claims, actual use of CT scans and MRIs is 4.7 times the expected rate.[8]

Physical Medicine

Physical medicine constitutes more than one-third of all outpatient medical care costs in California workers' compensation (CWCI 2003). Among all workers' compensation low back soft tissue complaints (sprains and strains) the average number of physical medicine visits was 16.5 and the median number of visits was 6 (Table 6).

Table 6. Overall Utilization: Physical Medicine

	Low Back – Soft Tissue Complaints		Low Back – Nerve Involvement	
	All Claims	Indemnity Claims	All Claims	Indemnity Claims
Total Claims	168,885	74,343	10,416	7,601
Claims w/ Medical Resource	101,638	58,768	8,155	6,438
Percent of Claim Pool	60.2%	79.1%	78.3%	84.7%
Utilization				
Mean (Avg. # of visits)	16.5	25.3	33.2	38.8
Median # of visits (50th percentile)	6	11	17	21

Among injured workers with low back conditions with nerve involvement, the average number of physical medicine visits was 33.2 (38.8 for indemnity cases), while the median number was 17 (21 for indemnity cases).

6 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.

7 ACOEM Occupational Medicine Practice Guidelines, ed .2, p. 303.

8 While this difference reflects a strict interpretation of the guideline, a small number of imaging studies may be justified to clarify cases with a medical history that cannot be confirmed on clinical examination.

According to the ACOEM guidelines evidence base, the recommended number of visits would be two or less, for teaching a home exercise program.[9] Utilization of physical medicine exceeded the ACOEM-expected level in 70 percent of all workers' compensation low back soft tissue cases (and in 80 percent of those cases in which there was lost-time). Furthermore, use of physical medicine exceeded the ACOEM-expected level in 90 percent of the workers' compensation low-back cases with nerve involvement. Compliance with the ACOEM guidelines would have recommended 7.9 percent of the physical medicine visits used in the low back pain cases, and 5.2 percent of the physical medicine visits for low back conditions with nerve involvement.

Chiropractic Manipulation

Chiropractic manipulation was used in 10.7 percent of all low back soft tissue complaints in the sample, and in 19.1 percent of indemnity claims in this diagnostic category (Table 7).

Table 7. Overall Utilization: Chiropractic

	Low Back – Soft Tissue Complaints		Low Back – Nerve Involvement	
	All Claims	Indemnity Claims	All Claims	Indemnity Claims
Total Claims	168,885	74,343	10,416	7,601
Claims w/ Medical Resource	18,074	14,187	3,387	2,637
Percent of Claim Pool	10.7%	19.1%	32.5%	34.7%
Utilization				
Mean (Avg. # of visits)	24.8	29.9	35.8	40.5
Median # of visits (50th percentile)	11	15	20	23

Overall, low-back soft tissue injury claimants receiving this type of treatment averaged just under 25 chiropractic manipulation visits, while the median number of visits was 11. Almost one in five low back soft tissue complaint indemnity cases involved chiropractic manipulation, and these cases averaged almost 30 visits, while the median number of visits for this group was 15.

Use of chiropractic manipulation was even heavier for low back conditions with nerve involvement, where roughly one-third of the cases utilized this type of care. Across all claims in this diagnostic category, injured workers averaged just under 36 chiropractic manipulation visits, while the median number of visits was 20. Indemnity claims in this category averaged more than 40 visits for chiropractic manipulation, while the median number of visits was 23.

The ACOEM evidence base recommends chiropractic manipulation as effective for approximately 12 visits within the first three to four weeks for low back complaints without nerve involvement[10]—a level reached at the 50th percentile for all cases of low back sprain and strain. The ACOEM guideline would have recommended 4.1 percent of the chiropractic manipulation visits for these low-back soft tissue cases, but none of the visits for the low back claims with nerve involvement.

Back Surgery (Laminectomies and Spinal Fusions)

According to the ACOEM evidence-base guidelines, only patients with severe disease benefit from surgery in the first three months. Table 8 shows that from 1997 through 2000, 1.4 percent of all California workers' compensation claimants diagnosed with low back soft tissue complaints underwent surgery. The average number of surgeries for these workers was 2.2 and the median number of surgeries was 1. In addition, 9.3 percent of those diagnosed with low back conditions with nerve involvement underwent surgery, and the rate was 12.2 percent among indemnity claims. The average number of surgeries for all claimants was 2.5, and 2.8 for lost time claims, and the median number of surgeries for both low back categories was 1.

Table 8. Overall Utilization: Surgery (Laminectomy/Fusion)

	Low Back – Soft Tissue Complaints		Low Back – Nerve Involvement	
	All Claims	Indemnity Claims	All Claims	Indemnity Claims
Total Claims	168,885	74,343	10,416	7,601
Claims w/ Medical Resource	2,374	2,199	968	931
Percent of Claim Pool	1.4%	3.0%	9.3%	12.2%
Utilization				
Mean (Avg. # of visits)	2.2	2.2	2.5	2.8
Median # of visits (50th percentile)	1	1	1	1

9 ACOEM Occupational Medicine Practice Guidelines, ed.2, p. 299.

10 ACOEM Occupational Medicine Practice Guidelines, ed. 2, p. 298. The Guidelines accepted the recommendation of the Mercy Guidelines, which were for 3 visits a week for 4 weeks.

Tables 9 and 10 display the fusion and laminectomy rates for each of the diagnosis codes within these two low back categories. The ACOEM evidence base indicates that surgery is not appropriate for any of the diagnoses within the soft tissue complaints category, yet Table 9 shows surprisingly high surgical rates for Backache NOS (5.2 percent) and Sprain of Sacrum (4.0 percent).

**Table 9. Surgical Rates by Diagnosis Code
Low Back – Soft Tissue Complaints**

	Total Cases	Surgeries	Surgical Rate
Sprain Lumbar Region	76,015	854	1.1%
Sprain Lumbosacral	49,077	674	1.4%
Lumbago	13,497	171	1.3%
Backache NOS	8,746	456	5.2%
Sprain of Back NOS	8,728	83	1.0%
Sprain Sacroiliac NOS	7,882	65	0.8%
Sprain Sacroiliac Region	1,127	9	0.8%
Sprain Sacroiliac	1,025	5	0.5%
Sprain of Sacrum	810	32	4.0%
Sprain Sacroiliac NEC	707	2	0.4%
Somatic Dysfunction of Lumbar Region	660	10	1.6%
Sprain of Coccyx	308	9	2.9%
Sacroiliitis NEC	195	3	1.3%
Somatic Dysfunction Sacral Region	78	1	1.6%
Psychogenic Pain NEC	30	–	0.0%
Total	**168,885**	**2,374**	**1.4%**

For the low back nerve involvement category, ACOEM considers only cases with disk protrusion or stenosis (in bold on Table 10) to be surgical candidates.

**Table 10. Surgical Rates by Diagnosis Code
Low Back – With Nerve Involvement**

	Total Cases	Surgeries	Surgical Rate
Lumbosacral Neuritis NOS	4,035	367	9.1%
Lumbar Disc Displacement	3,716	346	9.3%
Sciatica	2,185	198	9.1%
Thorac/Lumb Disc Displacement	213	25	11.7%
Spinal Stenosis-Lumbar	139	16	11.5%
Spinal Stenosis NOS	110	13	11.8%
Spinal Stenosis NEC	18	3	16.7%
Total Displacement & Stenosis Cases	4,196	403	9.6%
Total	**10,416**	**968**	**9.3%**

Under the ACOEM guidelines, fusions or laminectomies would not have been recommended in any of the soft tissue cases, or in any of the low back nerve involvement cases in which Sciatica or Neuritis were the primary diagnosis. Thus, the ACOEM guidelines would not have recommended 88 percent (2,939 out of 3,342) of the fusions and laminectomies performed on the low back claim sample. In addition, the overall surgical mean value, noted in table 8, shows the high incidence of multiple surgeries, with 2.2 surgeries for soft tissue complaints and 2.5 surgeries for nerve involvement, another dimension of the high degree of inappropriate utilization.

Disability Durations

The California workers' compensation system provides temporary disability benefits for injured workers with time loss from their place of employment. Table 11 shows the duration of disability (average and median number of days off) for low back soft tissue and low back nerve involvement indemnity claims.

Table 11. Length of Disability (Days)

	Low Back – Soft Tissue Complaints	Low Back – Nerve Involvement
Total Claims	74,343	7,601
Claims w/ Medical Resource	74,343	7,601
Percent of Claim Pool	100.0%	100.0%
Utilization		
Mean # of days	63.9	113
Median # of days (50th percentile)	25	50

Among lost-time cases, the average number of days away from work in California was 63.9 for low back strain and sprain injuries and 113 for low back conditions with nerve involvement. The median duration of absence from work for low back soft tissue complaints in California was 25 days, while for claims involving low back with nerve involvement, the median time off work was 50 days. These disability durations are significantly longer than those documented for work-related health problems by The National Health Interview Survey (NHIS) noted in the ACOEM guidelines[11] and the federal Occupational Safety and Health Administration (OSHA).[12]

NHIS data also show average disability durations of 6 to 10 days for comparable injuries. Applying NHIS ranges to the California data shows the guidelines evidence base for low back pain without nerve involvement would have recommended 9.4 percent to 15.6 percent of these lost work days, while the guidelines evidence base for low back injuries with nerve involvement would have recommended between 5.3 percent to 8.8 percent of the lost work days.

11 ACOEM Occupational Medicine Practice Guidelines, ed. 2, p. 302. The NHIS survey is a national probability sample that is statistically representative of the US population. There are questions about lost work time, allowing durations for work-related problems to be calculated.

12 Harris 2001.

Discussion

Evidence-based medicine, an objective, scientific process of evaluating the efficacy of medical services and tests, began 30 years ago out of the need for a reliable method of evaluating and using medical research to improve medical decision-making. Early proponents of EBM believed that subjective or random treatment strategies in use at the time created random outcomes, a situation that compromised quality of care and increased costs to the individual and overall healthcare system.

This study compared actual utilization patterns for two common low back diagnostic groups in California workers' compensation to expected levels of treatment recommended by ACOEM's Occupational Medicine Practice Guidelines, Second Edition. The results show wide variation in service utilization and significant differences between actual levels of medical testing and treatment services and recommended levels supported by the ACOEM evidence base. According to the comparative data, approximately 4-8 percent of physical medicine and chiropractic visits used to treat low back sprain and strain injuries in California workers' compensation are supported by the ACOEM evidence base, while eight of nine back surgeries performed on injured workers with these diagnoses were not supported by the ACOEM guidelines. Finally, the time lost from work for low back injuries, as measured in weeks of temporary disability, ranged from 6 to 10 times longer than the temporary disability durations anticipated by the ACOEM evidence base.

Wide variation in practice patterns, as well as the differences between actual utilization levels and those anticipated by ACOEM guidelines, are especially relevant in California workers' compensation, where average medical care costs for an indemnity claim have more than tripled in 10 years. Several public policy studies document increased utilization in many forms of medical care that were associated with longer treatment periods, higher costs, more lost time from work, and increased levels of attorney involvement and litigation – all characteristics of sub-optimal system performance.

The ongoing workers' compensation reform debate in California, which seeks to decrease medical costs without compromise in quality of care, originates from the fundamental principle in the workers' compensation system that it is the employer's financial responsibility to provide all medical treatment that is reasonably required to "cure and relieve from the effects of the injury." The new data presented in Part II of this analysis suggest that the payment of medical expenses by employers currently is well beyond the constitutional and statutory standards established in the Workers' Compensation Act. Employers are being required to pay for unsubstantiated, excessive, or experimental medical services that have questionable outcomes, and which are often associated with extended absence from work that is detrimental to the injured worker and the system as a whole.

Applying the Evidence Base: Current Challenges

In the last two legislative sessions, California lawmakers retooled prior reform efforts. The primary treating physician's presumption of correctness for medical issues has been strictly limited in most cases,[13] and superseded by a presumption favoring evidence-based medicine guidelines[14] as a more rational method to achieve the goals of controlling medical costs and raising the quality of care.

Stakeholder Implementation Issues

The role of each participant in the workers' compensation system must be addressed to ensure a consistent and enforceable treatment standard.

- **Injured Employee:** A central focus of the Cochrane Collaboration is making evidence-based information available to health care consumers at the point of need. In addition to their injuries, workers already face an unfamiliar, complicated, and some would say hostile, benefit system with a well-documented inability to provide the right information at the right time (Sum 1996). If one overlays the complexities of evidence-based treatment guidelines without the associated support and encouragement of treating physicians, the injured workers' anxiety and fear will impact the quality of their medical care.

13 The presumption is still in effect for employees who pre-designate a specific provider before an injury occurs.

14 The presumption noted in Senate Bill 228 goes into effect April 2004 and stays in effect until the Division of Workers' Compensation promulgates new UR guidelines.

- **Physicians and Other Healthcare Providers:** Almost one-third of California workers' compensation claims and benefit dollars are tied to vague and ill-defined diagnoses that fall outside of the ACOEM evidence-base. All medical treatment decisions flow from the diagnosis, and this high proportion of inadequate diagnostic identification needs to be reduced for the process to work. Practice guidelines form the basis for operations of an evidence-based medical organization, and the results show that successful implementation of such guidelines can dramatically improve patient outcomes (NCQA, 2003). There is evidence that guidelines alone will not change provider behavior or improve outcomes (Lomas, 1990). To ensure that the promise of improved medical results comes to fruition, physicians must have a comprehensive knowledge of the guidelines and apply them consistently and with confidence. Physicians must encourage and reassure their patients that evidence-based medicine represents the best medical judgment regarding their treatment plan.
- **Claims Administrators, Case Managers and Managed Care Organizations:** A recent study demonstrated that many reimbursement decisions that allow or disallow care are made with an inconsistent medical basis (Harris, 2003). Claims adjusters and their administrative support systems should be trained to use the same criteria as providers in managing the administrative components of benefit delivery and adjudication.
- **Labor Code Rules, Regulations, Legal Interpretations, and Dispute Resolution:** A rationale for the 2003 California legislative reforms was to leverage evidence-based medicine to create a specific standard of medical care for injured workers, supported by a legal presumption favoring evidence-based treatment guidelines. It is still an open question as to whether the statutory presumption contained in the Labor Code can actually accomplish the intent of giving evidence-based treatment guidelines added credibility and legal authority. (Neuhauser 2003, CWCI 2003)

It is important to reiterate that guidelines are not absolute rules and are not intended to usurp the judgment of physicians. They will be subject to interpretation on a case-by-case basis, because for many treating physicians, the absence of evidence that a procedure provides benefit is not conclusive proof that the procedure lacks benefit.

Nevertheless, over-utilization without proven benefit is an inappropriate use of medical care. In the California system, there are often disagreements between the injured worker (and their representatives) and the payor over the need to pay for questionable medical testing and treatment. Currently, Workers' Compensation Administrative Law Judges and the Appeals Board resolve medical care disputes in accordance with the mandate to "cure or relieve" contained in Labor Code section 4600. In part, because that standard is not defined, a considerable amount of ineffective medical care is approved for payment. Over time, as the evidence-base gains acceptance at all levels of the system, the linkage of payment to evidence of effectiveness in specific clinical situations should reduce ineffective medical care.

Summary

Evidence-based medicine offers significant promise to curb excessive, unnecessary, and sometimes harmful levels of medical care in the California workers' compensation system. The results of this study, along with results of other research, make it clear that under correct conditions, EBM guidelines can both raise the quality of care and reduce costs.

Practical experience cautions that the correct conditions include more than just the presence of an evidence-base of research findings. Data from this study show significant differences between actual and ACOEM-recommended levels of tests, treatment and duration of temporary disability. The gulf between actual and recommended levels of treatment illustrates the scope of the change and the challenge that lie ahead – yet it also points to the huge potential to reduce unnecessary or ineffective treatment and generate significant savings. To reduce medical costs and assure the highest quality of care, as intended by the Legislature, will require all stakeholders to integrate EBM guidelines into their medical practices, administrative processes, and judicial determinations.

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