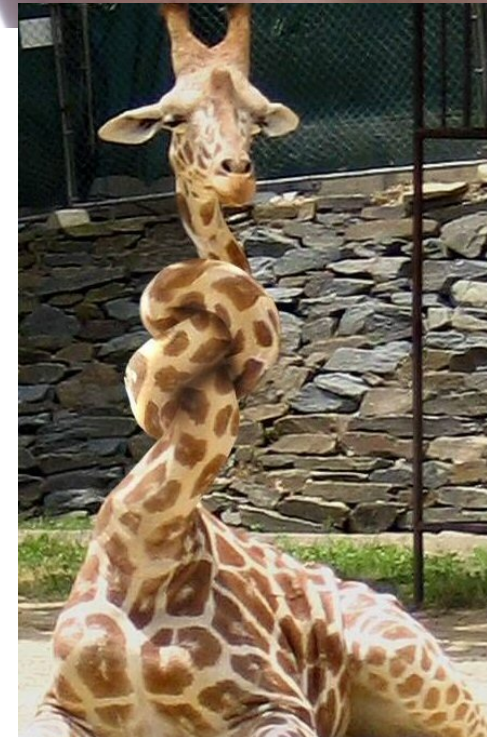


# NECK PAIN

COA QME Course

What's New?

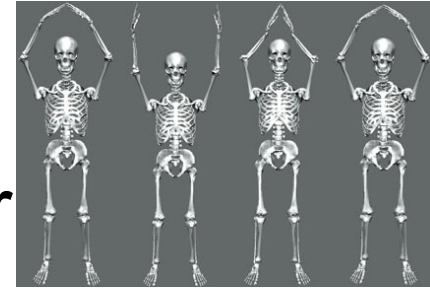
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# Questions ?



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## Financial “Conflict of Interest” Disclosure

- Author and Consultant: American Medical Association

– Impairment and Disability publications, including:

- *AMA Guides, 5<sup>th</sup> & 6<sup>th</sup> Editions,*
- *Guides to Work Ability and Return to Work*
- *Guides to Disease and Injury Causation, 2<sup>nd</sup> Edition*

- Reed Group, LTD: [www.mdguidelines.com](http://www.mdguidelines.com)

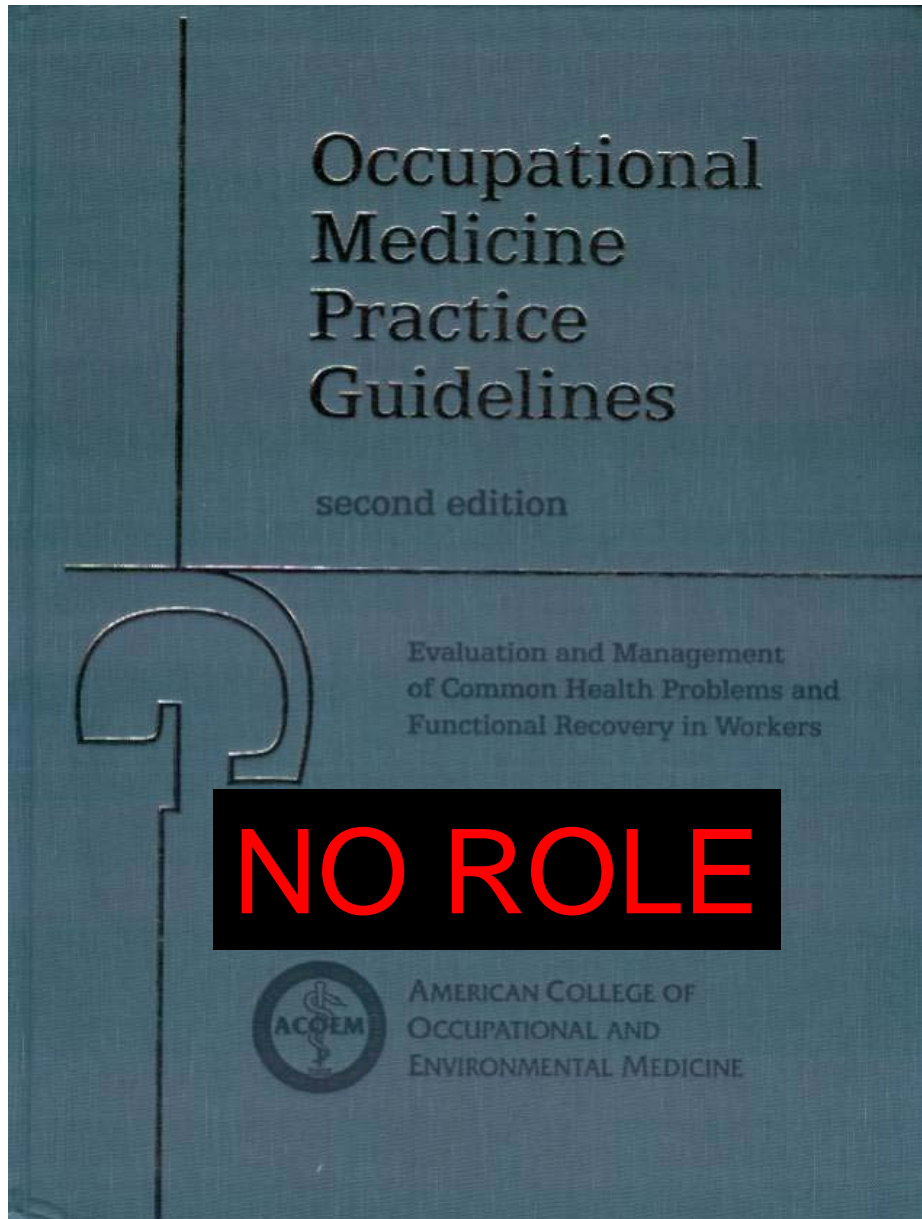
– *Disability duration guidelines*

- US Federal Motor Carrier Safety Admin  
(consultant)

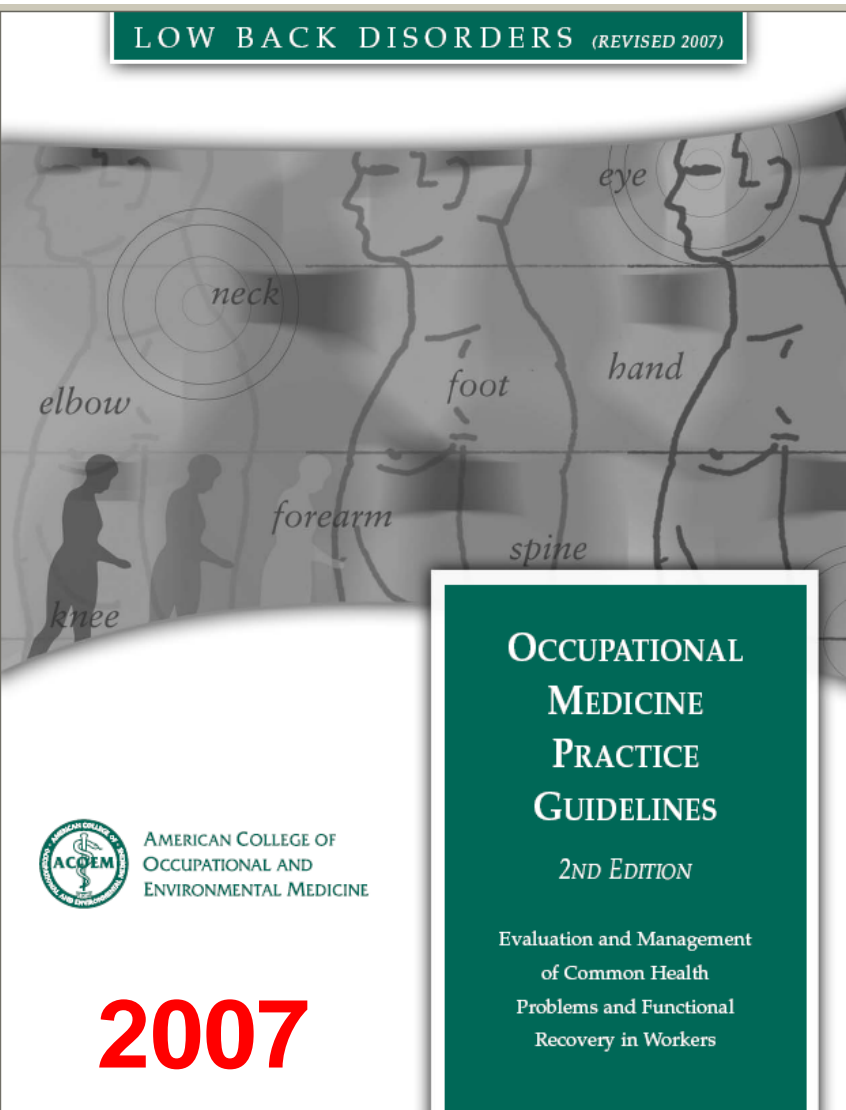


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# ACOEM's *Practice Guidelines*, 2<sup>nd</sup> Edition



# UNPAID CHAIR: Spine Committee



- Legally presumed correct treatment for workers' compensation utilization review in California and Nevada.
  - 366 pages
  - 1310 articles reviewed and referenced.
- Neck chapter 2011 update
  - 332 pages
  - 895 articles reviewed and referenced

# Other Professional Activity

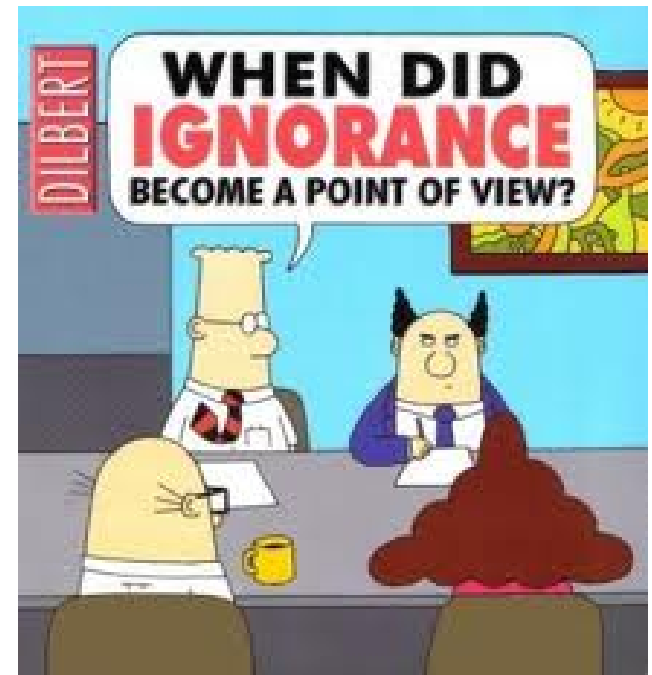
## UNPAID

- Peer Reviewer for:
  - *Archives of Physical Medicine & Rehabilitation*
  - *The Spine Journal*
  - *American Family Physician*
  - *Journal of Occupational and Environmental Medicine*
- Editorial Advisory Board:
  - *The Spine Journal*
  - *Tennessee Medicine*



# Adult Neck Disorders

- Compared with low back pain, there are **relatively few quality trials** evaluating cervical pain and still fewer that evaluate work-related cervical pain.
- We know more about  
The low back



# New Guidelines

- **Bone and Joint Decade**
- JOEM 2010; 52 (4): 424-7
- **Spine 2008; 33 (4S): S1-S220**
- Table of Contents
- Preface
- Editorial Preface
- Editorial
- Executive Summary
- Introduction/Mandate
- Conceptual Model and Self-Study
- Methodology
- Best Evidence on the Burden and Determinants of Neck Pain
- Best Evidence on the Course and Prognostic Factors for Neck Pain
- Best Evidence on Assessment and Intervention for Neck Pain
- Supplementary Research Studies
- Implications and Recommendations From the Neck Pain Task Force



# Bone and Joint Decade

- The **Bone and Joint Decade 2000 to 2010** **Task Force on Neck Pain** and Its Associated Disorders began its work in 2000, with the mandate to study neck pain and disorders associated with neck pain and make recommendations that would reduce the health consequences of neck pain.
  - an initiative of the **United Nations** and the **World Health Organization**

# Bone and Joint Decade

- The Neck Pain Task Force completed its deliberations and **published** its findings as a supplement in the journal **Spine** in 2008
  - **Haldeman S**, Carroll LJ, Cassidy JD, Scientific Secretariat of the Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders. A best evidence synthesis on neck pain: findings from the Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders.
  - **Spine. 2008;33(4 suppl):S1–S220.**
  - **220 pages**

# Bone and Joint Decade

- The Task Force consisted of a
  - 5 member Executive Committee,
  - 13-member Scientific Secretariat,
  - 17-member Advisory Committee,
  - 18 research associates and graduate students.
- Task Force members originated from **9 countries** and represented **14 clinical and scientific disciplines** or specialties.

# Bone and Joint Decade

- The literature published from **1980 to 2006** was searched using a sensitive rather than specific search strategy.
- This yielded **31,878 citations**, and after screening these citations for relevance to the Neck Pain Task Force mandate, **1203 articles** were found, which met the relevance criteria.

# Bone and Joint Decade

- The **552 studies** judged to have adequate internal validity were entered into evidence tables, from which we developed our best-evidence syntheses on the following:
  - the **burden** and determinants of neck pain in the general population, in workers, and in whiplash-associated disorders (WAD);
  - the course and **prognostic factors** for neck pain in the general population, in workers, and in WAD;
  - **assessment** of neck pain; and
  - surgical and nonsurgical **interventions** in neck pain.

# **Key Findings From the Task Force**

## **Epidemiology of Neck Pain and Risk Factors**



# Bone and Joint Decade

- **Most people** can expect to experience some neck pain in their lifetimes, although for the majority, neck pain will not seriously interfere with normal activities.
- Nevertheless, a **significant minority** will develop **recurrent** neck pain, and **some will develop associated disability**

# Bone and Joint Decade

- Analyses of risk factors for neck pain suggest that this disorder has a multifactorial etiology. **Non-modifiable** risk factors for neck pain included
  - **age** (the incidence of neck pain peaks in the middle years, then decreases),
  - **female gender**, and
  - genetics.
- There is **no evidence** that common **degenerative changes** in the cervical spine **are a risk factor for neck pain.**

# Bone and Joint Decade

- **Modifiable risk factors** for neck pain include:
  - psychologic health,
  - smoking,
  - exposure to **environmental tobacco**,
  - physical activity participation (protective)**.

# Bone and Joint Decade

- **In the workplace,**
  - repetitive and precision work,
  - sedentary work position (ie, prolonged standing, sitting, or doing computer work),
  - working with the cervical spine in flexion for prolonged periods of time,
  - poor keyboard position (eg, keyboard positioned too close to the desktop edge),
  - mouse position requiring flexion of shoulders of more than 25 degrees),
  - use of chairs without armrests,
  - using telephone shoulder rests,
  - using a computer monitor requiring poor head posture (eg, a head tilt of more than 3 degrees),
  - high levels of psychologic job strain,
  - low coworker social support, and
  - job insecurity

**increased the risk of neck pain,  
NOT the risk of neck pathology.**

# Bone and Joint Decade

- Nevertheless, there is a **lack of evidence** that **workplace interventions** aimed at modifying workstations and worker posture **were effective** in reducing the incidence of neck pain in workers.
- One of Austin Bradford-Hill's **causation criteria** is that if a “proposed” risk factor is involved in causation, **decreasing or eliminating the risk factor should decrease** the **disease incidence**.

# Bone and Joint Decade

- **Eliminating insurance payments for pain and suffering** is associated with a **lower incidence of whiplash claims and faster recovery** from symptoms.
- Motor **vehicle head restraint** devices aimed at limiting head extension during rear-end collisions were found to have a **preventive effect**, especially for women.

# Bone and Joint Decade

## **Course and Prognosis of Neck Pain**

# Bone and Joint Decade

- **Most people with neck pain do not experience a complete resolution of symptoms.**
- Between **50% and 85%** of those who experience neck pain at some initial point will report **neck pain again** 1 to 5 years later.
- These numbers appear to be similar in the general population, in workers, and in patients after motor vehicle crashes.



# Bone and Joint Decade

- **Poor health and prior neck pain episodes were associated with a poorer prognosis** in workers and in the general population.
- In the general population, **poor psychologic health, worrying**, and **becoming angry** or frustrated in response to neck pain were all associated with **poorer prognosis**, and greater optimism and a coping style that involves self-assurance and having less need to socialize were all associated with better prognosis.

# Bone and Joint Decade

- Specific workplace or **physical job demands were not linked with recovery** from neck pain in workers.
- The evidence suggests that workers who engaged in **general exercise and sporting activities** were more likely to **experience improvement** in neck pain, although this needs more study.

# Bone and Joint Decade

- There is also evidence that neck injury claims that involve **tort compensation systems** (ie, payment for pain and suffering) and **legal representation** factors have a **poorer prognosis for recovery from WAD.**



# Spine 2010: 35 (18): 1684-1690

- 1993-1996 enrolled 508 **WAD** patients and 497 **matched controls**. Baseline MRI.
- **10 years later, restudied both groups.**
- **Conclusion.** The results of this study suggest that, although some WAD patients are more likely to suffer from long-lasting neck pain, **MRI findings can not explain the symptoms.**

# Spine 2010: 35 (18): 1684-1690

- No clear pathologic explanation for symptoms

Long-Term Follow-up of Whiplash • Matsumoto et al 1689

**Table 10. Relationships Between Clinical Symptoms and Progression of Degenerative MRI Findings**

	Neck Pain		Shoulder Stiffness		Headache		Arm Pain/Numbness	
	WAD	Control	WAD	Control	WAD	Control	WAD	Control
Decrease in signal intensity of intervertebral disc								
Progressed	30/109 (27.5)	14/132 (10.6)	58/109 (53.2)	34/132 (25.8)	30/109 (27.5)	9/132 (6.8)	16/109 (14.7)	7/132 (5.3)
Not progressed	4/24 (16.7)	8/91 (8.8)	15/24 (62.5)	29/91 (31.9)	7/24 (29.2)	7/91 (7.7)	7/24 (29.2)	3/91 (3.3)
Posterior disc protrusion								
Progressed	27/101 (26.7)	17/155 (11.0)	53/101 (52.5)	44/155 (28.4)	29/101 (28.7)	12/155 (7.7)	19/101 (18.8)	8/155 (5.2)
Not progressed	7/32 (21.9)	5/68 (7.4)	20/32 (62.5)	19/68 (27.9)	8/32 (25.0)	4/68 (5.9)	4/32 (12.5)	2/68 (2.9)
Disc space narrowing								
Progressed	7/33 (21.2)	6/59 (10.2)	15/33 (45.5)	19/59 (32.2)	5/33 (15.2)	5/59 (8.5)	8/33 (24.2)	5/59 (8.5)
Not progressed	27/100 (27.0)	16/164 (9.8)	58/100 (58.0)	44/164 (26.8)	32/100 (32.0)	11/164 (6.7)	15/100 (15.0)	5/164 (3.0)
Foraminal stenosis								
Progressed	1/6 (16.7)	1/20 (5.0)	5/6 (83.3)	6/20 (30.0)	1/6 (16.7)	0/20 (0)	2/6 (33.3)	1/20 (5.0)
Not progressed	33/127 (26.0)	21/203 (10.3)	68/127 (53.5)	57/203 (28.1)	36/127 (28.3)	16/203 (7.9)	21/127 (16.5)	9/203 (4.4)

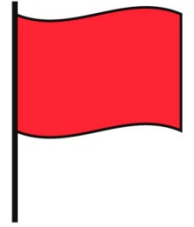
No statistically significant difference was observed between any MRI finding and clinical symptom ( $\chi^2$  test).  
WAD indicates whiplash-associated disorder; MRI, magnetic resonance imaging.



# Bone and Joint Decade

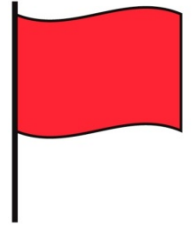
## Assessment and Diagnosis of Neck Pain

# Bone and Joint Decade



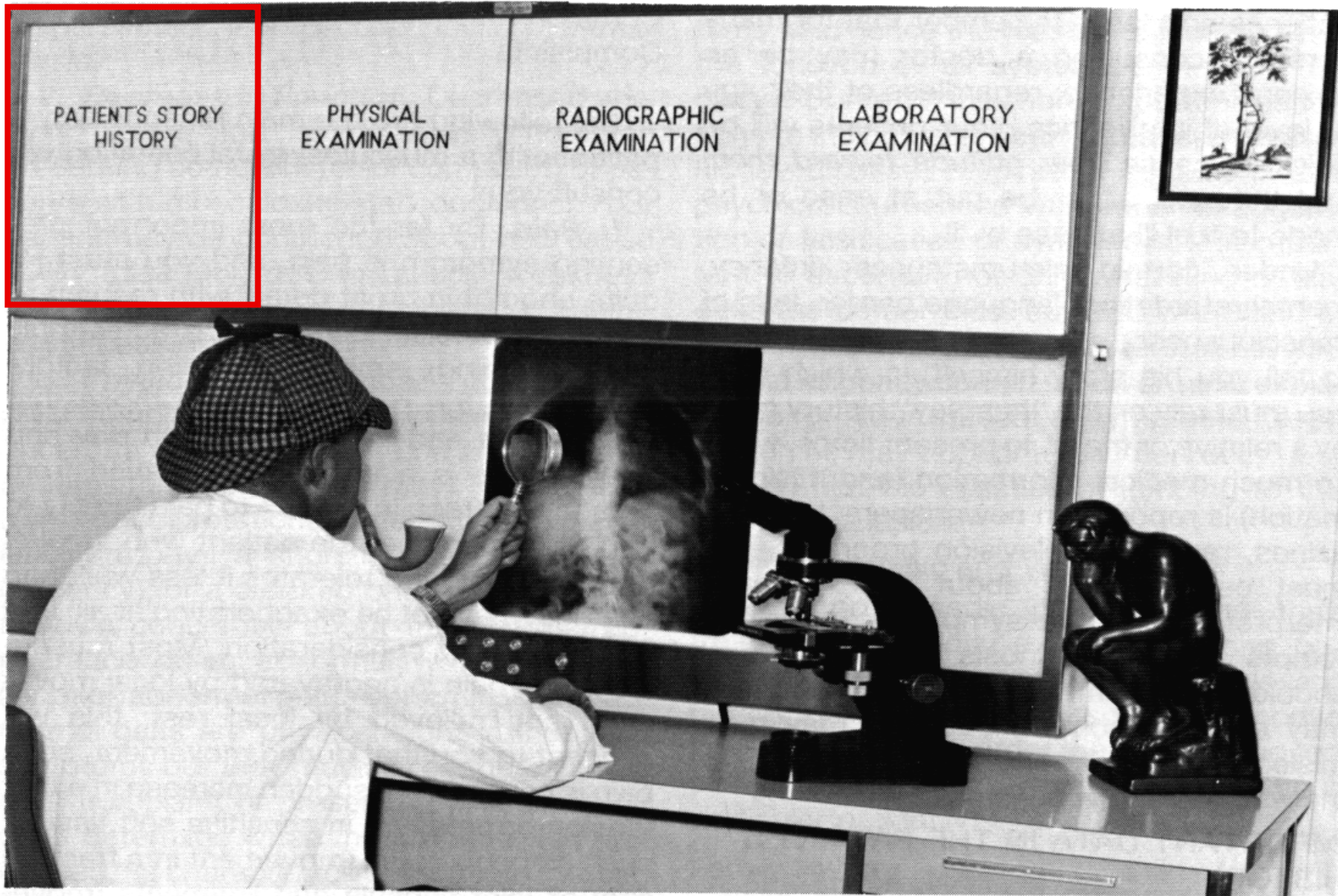
- There is currently **no validated set of “red flags”** to be used to rule out serious pathology when triaging patients with no exposure to blunt trauma.
- The Neck Pain Task Force suggests an extrapolation of existing recommendations for ruling out serious conditions affecting the lumbar spine.

# Bone and Joint Decade



- **Serious diseases** to consider include (but are not limited to):
  - pathologic fractures (eg, resulting from decreased bone density caused by osteoporosis or corticosteroid treatment);
  - neoplasms (eg, previous history of cancer, unexplained weight loss);
  - failure to improve after a month of evidence-based therapy;
  - **cervical myelopathy; [data now exists for this diagnosis]**
  - systemic diseases (eg, inflammatory arthritis);
  - Infections;
  - prior neck surgery.





**Figure 5.1.** The medical doctor, like Sherlock Holmes, must search out and correlate all available data in order to solve the mystery of a diagnosis.

Carragee: *The Spine Journal* 2008: 8; 311-319

“Validity of self-reported history in patients with acute back or neck pain after motor vehicle accidents”

- “The **accuracy** of self-reported previous axial pain **history** and comorbid conditions after MVA has **not been systematically evaluated** but has been assumed to be high.”
- **422** consecutive patients seen at the Stanford spine clinic completed standardized assessments.
  - Responses (History) compared to US DHHS surveys for prevalence
  - Responses for **randomly selected 100 patients** compared to their PRIOR medical records.
    - Diligent search for prior medical records

## **Conclusions** *The Spine Journal* 2008: 8; 311-319

In patients being seen for continued pain related to an MVA, the validity of self-reported previous axial pain and comorbid conditions appeared poor. The self-reported prevalence of previous axial pain and drug, alcohol, and psychological problems is much less than the documented prevalence in prior medical records. These rates were also markedly below the expected prevalence in age- and sex-matched populations. This effect was seen most prominently in patients perceiving the accident to be another party's fault and in those filing compensation claims. The failure to appreciate previous axial pain problems and drug, alcohol, and psychological problems may compromise patient care and public health opportunities.

# Carragee's Next Prospective Study

*The Spine Journal* 2009; 9: 4-13

STUDY DESIGN: A **prospective, multiclinic validation study** examining the critical elements of a patient's self-reported history after an MVA judged against an audit of his or her medical records.

PATIENT SAMPLE: A cohort of consecutive patients with persistent axial pain after an MVA was prospectively identified from five spine-specialist's outpatient clinics.

Of 702 patients, **335 subjects were randomly selected for auditing of their medical records.**

# Carragee's Next Prospective Study

*The Spine Journal* 2009; 9: 4-13

**RESULTS**: Overall, approximately **50%** of the subjects were found to have previous axial pain problems at audit when **none was reported to the spine-specialist after an MVA.**

Similarly, approximately **75%** of the subjects were found to have one or more preexisting comorbid conditions at audit that were **not reported during the evaluation after the MVA** (alcohol abuse, illicit drug use, and psychological diagnosis).

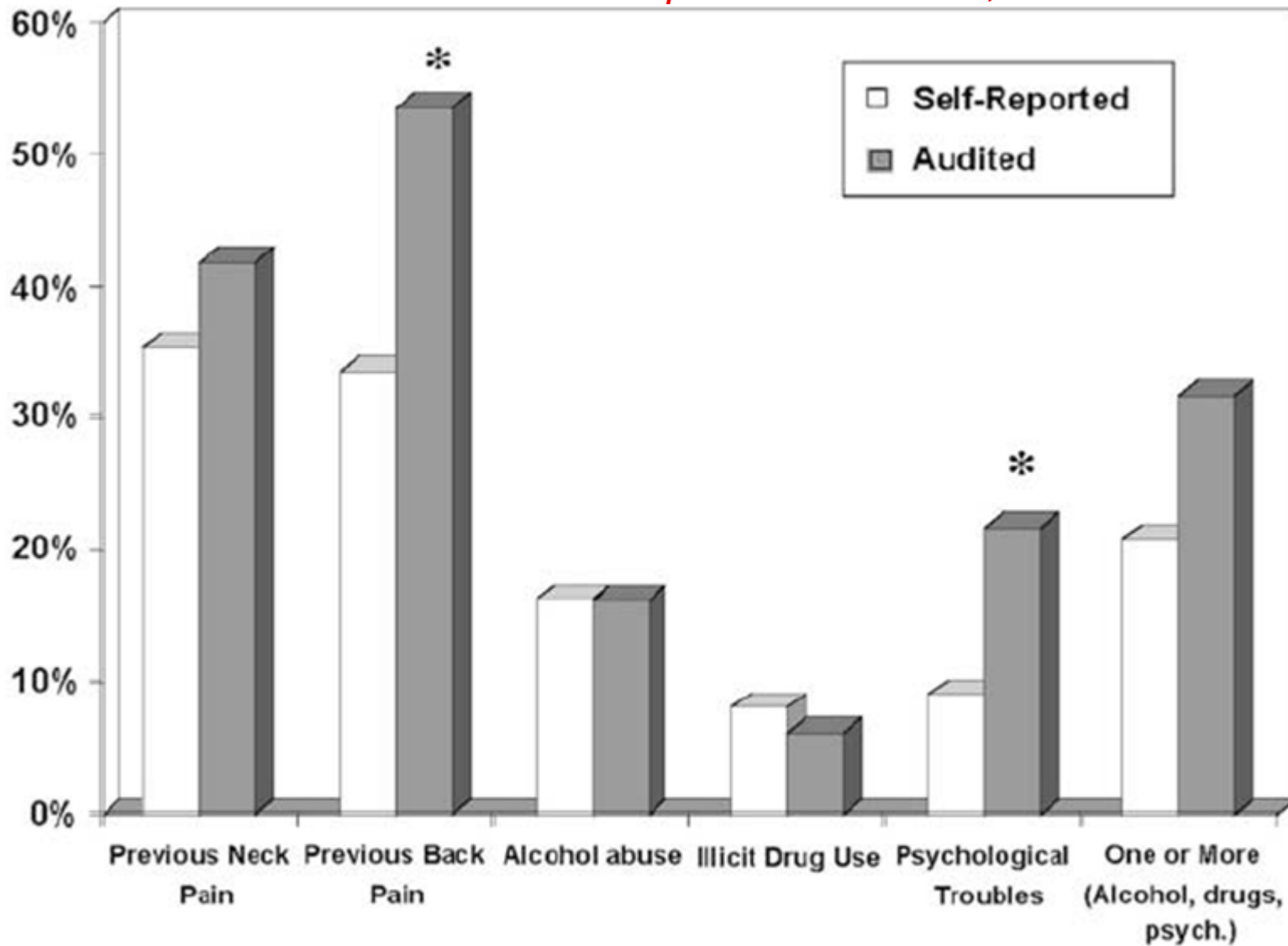


Fig. 2. Self-reported vs. audited comorbidities for the “No Fault” subjects (\*p<.01).

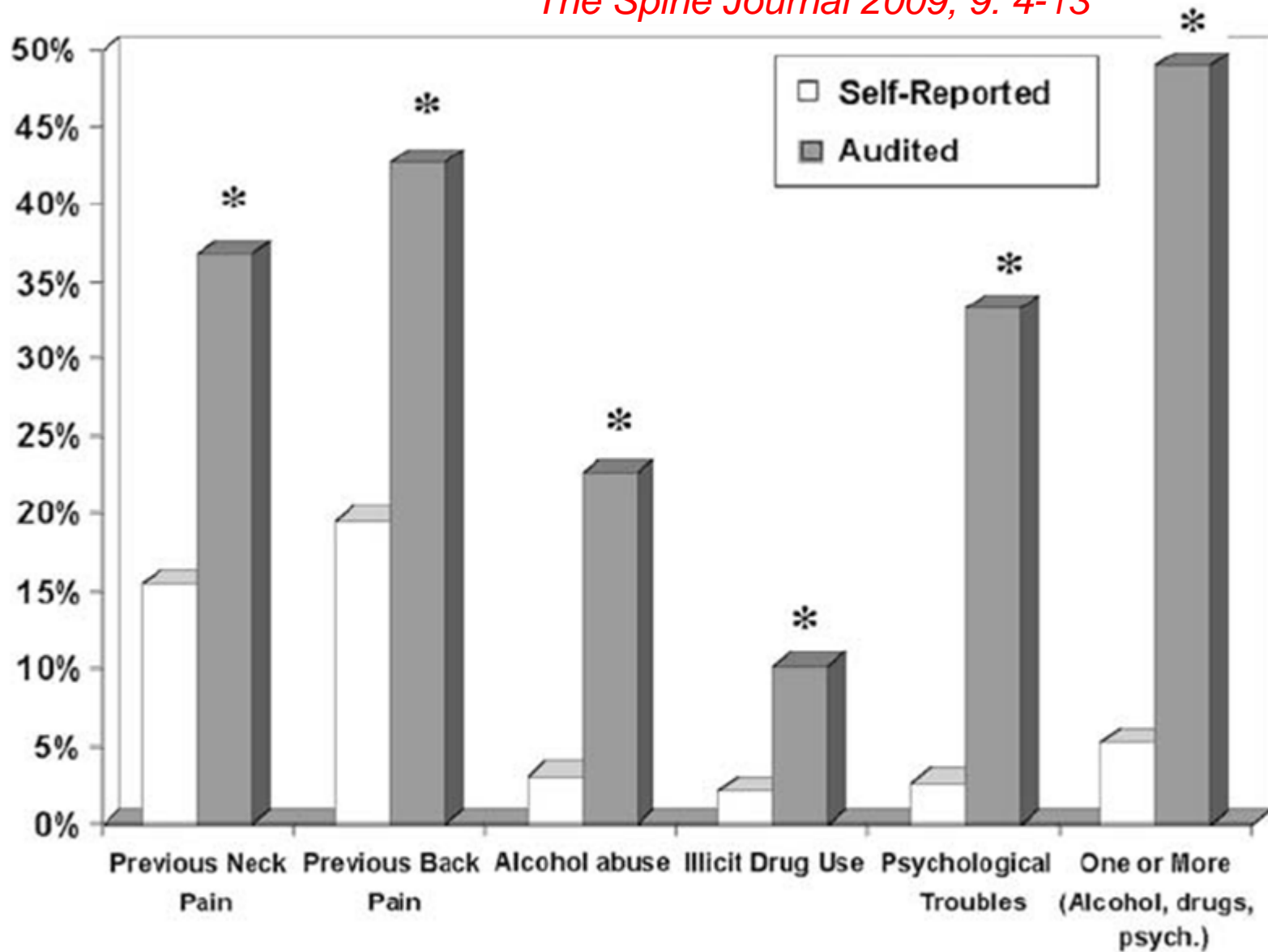


Fig. 3. Self-reported vs. audited comorbidities for the “Perceived Fault” subjects (\* [all items]  $p < .001$ ).

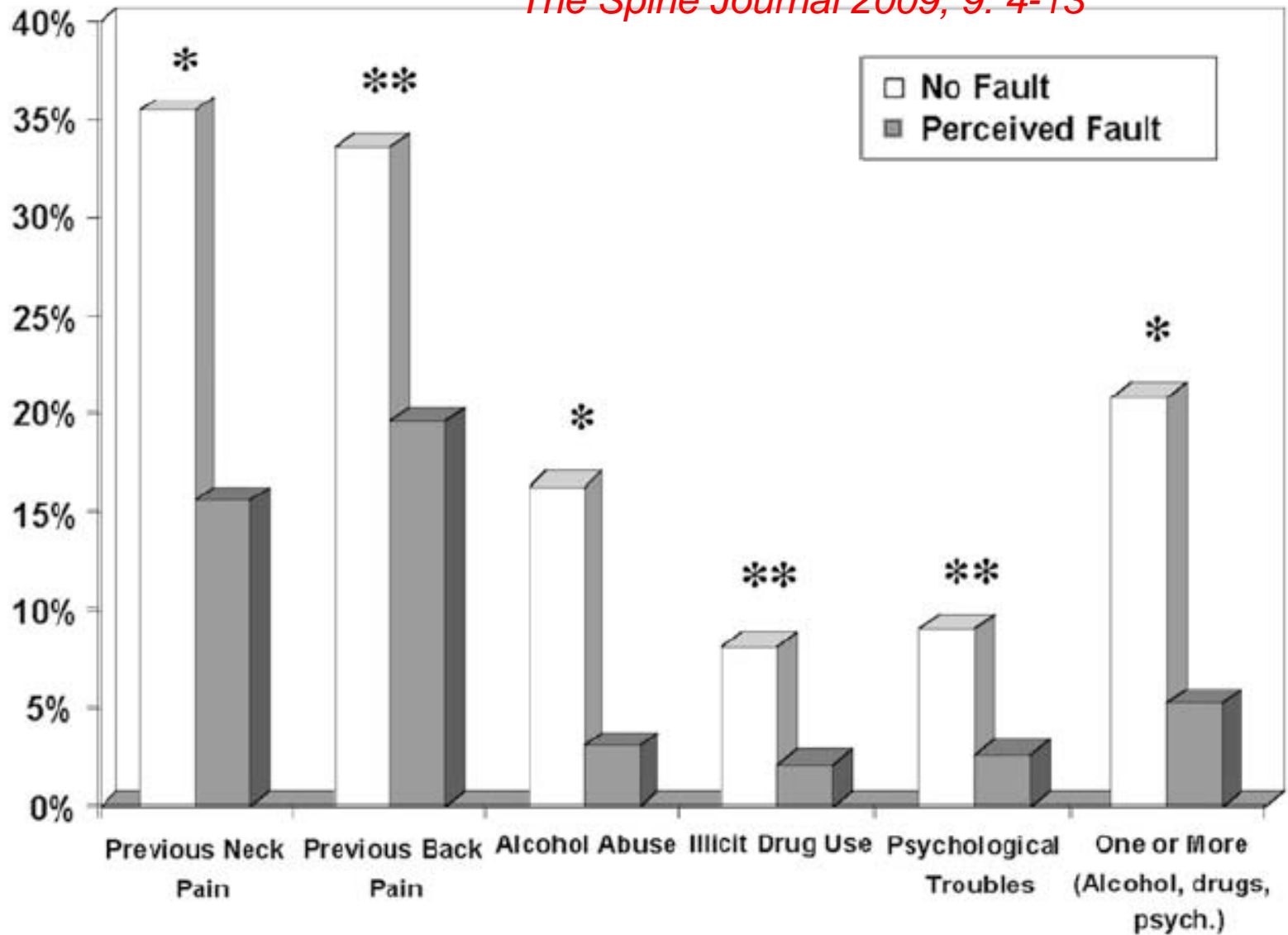


Fig. 1. Self-reported comorbidities for “No Fault” and “Perceived Fault” subjects (\* $p < .0001$ , \*\* $p = .001-0.05$ ).



# Carragee's Next Prospective Study

*The Spine Journal* 2009; 9: 4-13

**CONCLUSION:** The validity of the patient's self-reported history when presenting with persistent axial pain after an MVA appears poor in this large multiclinic random sample.

The self-reported rates of alcohol abuse, illicit drug use, and psychological diagnosis, as well as prior axial pain were significantly lower than that seen in the medical records, especially in those who perceive that the MVA was another's fault.

# Carragee's Next Prospective Study

*The Spine Journal* 2009; 9: 4-13

- **CONCLUSION:** The failure to recognize this under-reporting may seriously compromise clinical care, public health efforts at injury prevention, and research protocols dependent on accurate pre-accident morbidity assessments.

# Bone and Joint Decade

Treatments for Neck Pain  
(Noninvasive and Invasive)

# Bone and Joint Decade

- A **number of nonsurgical treatments** (listed below) seemed to be more beneficial than usual care, sham, or alternative interventions, but **none** of the active treatments **were clearly superior** to any other in the short- or long-term.
- There is **no evidence** that a particular course of care with **any intervention improves the prognosis for WAD or non-WAD neck pain**, although there is evidence that **high health care utilization in the first month** after a traffic collision **may slow down recovery** in WAD

# Bone and Joint Decade

- A comparison of nonsurgical neck pain treatments suggests **no important differences among the five treatments.**
  - Nonsteroidal antiinflammatory drugs
  - Cox-2 nonsteroidal antiinflammatory drugs
  - **Exercise**
  - Mobilization
  - Manipulation

# Bone and Joint Decade

- For WAD, educational videos, **mobilization**, and **exercises** seem more beneficial than usual care or passive modalities alone.
- There is **evidence** that educational pamphlets, corticosteroid injections, **passive modalities** (such as transcutaneous electrical nerve stimulation, ultrasound, diathermy), and use of **collars** are **not effective**.

# Bone and Joint Decade

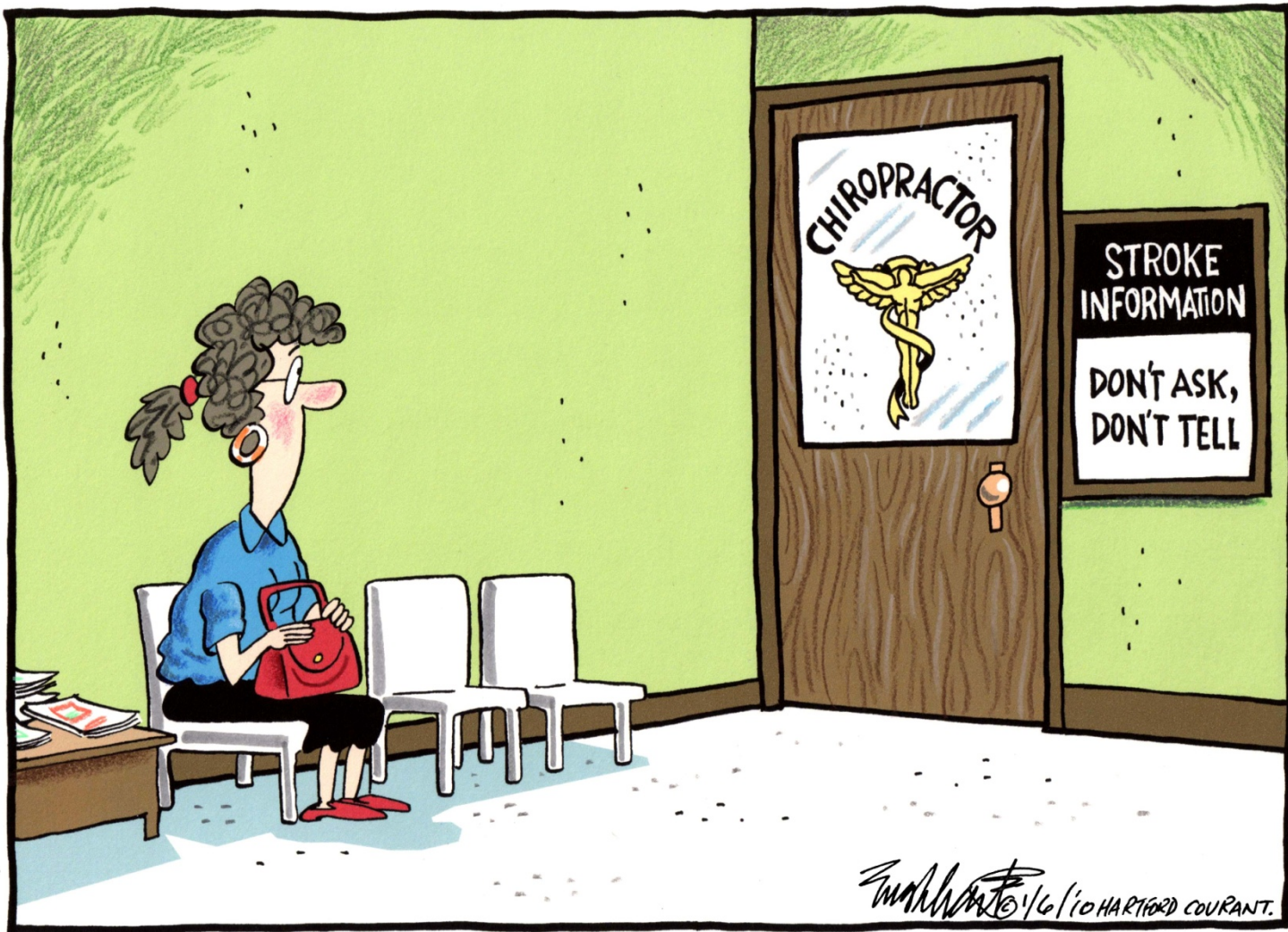
- The evidence for **acupuncture** was **less clear** (ie, some studies reported a benefit, whereas others reported no benefit).
- Overall, there seems to be **some benefit** of acupuncture in treatment of neck pain, although this should be further assessed in large, well-conducted intervention studies.

# Bone and Joint Decade

- For **both WAD** and **other neck pain** without radicular symptoms, the evidence supports interventions involving **active therapy**, combined with **education** emphasizing self-management and **return to normal function as soon as possible**, rather than interventions without such a focus.



# Manipulation and Stroke



# Vertebrobasilar Artery Stroke Study Findings

- Vertebrobasilar artery (VBA) stroke is a **rare event**.
- There was an **association** between receiving chiropractic care and subsequent VBA stroke in persons younger than 45 years of age.
- There was a **similar association** between receiving care from **general practitioners** and **subsequent VBA** stroke in this age group.
- This is likely **explained by** patients with VBA dissection related neck pain and/or headache **seeking health care** from chiropractors and general practitioners **before** having their stroke.
- **Thus, there is no additional risk associated with chiropractic care.**

# Bone and Joint Decade

- There is a **lack of evidence** about the harms or benefits of noninvasive interventions for neck pain with radiculopathy.

# Bone and Joint Decade

- There is evidence for **short-term symptomatic improvement** of radicular symptoms with epidural or selective root injections with corticosteroids, but these treatments **did not appear to decrease the rate of surgery** for decompression of cervical nerve roots.

# Pain Physician 2012; 15: E59-E70

- Fluoroscopic Epidural Injections in Cervical Spinal Stenosis: Preliminary Results of a Randomized, Double-Blind, Active Control Trial
- Methods: Patients with **cervical central spinal stenosis** were **randomly assigned** to one of 2 groups: injection of **local anesthetic only** **or** **local anesthetic mixed with** non-particulate **betamethasone**.
- **Sixty patients** were included in this analysis. Randomization was performed by computer-generated random allocation sequence.
- **Results:** **Significant pain relief** was seen in **73%** in Group I and **70%** in Group II, in Group II showing both significant pain relief and functional status improvements.
- Group I's **average relief per procedure** was  $11.3 \pm 5.8$  **weeks**; for Group II it was  $8.6 \pm 3.6$  **weeks**

# Bone and Joint Decade

- There is evidence that **surgical treatment of cervical radiculopathy** because of nerve root impingement results in **relatively rapid and substantial relief of pain** and impairment in the **short-term** (6 to 12 weeks after surgery).
- However, it is **not clear** from the evidence that **long-term outcomes are improved** with the surgical treatment of cervical radiculopathy compared with non-operative measures.



# Return to NFL Football

Hsu *Spine* 2011; 35 (18): 1684-90

**Table 3. NFL Players Diagnosed With a Cervical Disc Herniation Classified by Position**

N = 99

Position	No. Players	No. Operative	No. Nonoperative	No. Players Expected
Defensive lineman	12	8	4	19
Offensive lineman	11	8	3	19
Linebacker	17	10	7	13
Defensive back	31	12	19	15
Running back	8	4	4	10
Tight end	4	1	3	6
Wide receiver	7	5	2	9
Quarterback	8	4	4	6
Kicker	1	1	0	4

Number of players expected is based on the number of players on a typical National Football League roster. Aside from the position of defensive back, the number of players in this study closely matched that of a typical NFL roster. NFL indicates National Football League.

# NFL Players

Cervical HNP  
*Spine: E-pub*  
ahead of  
print  
Hsu

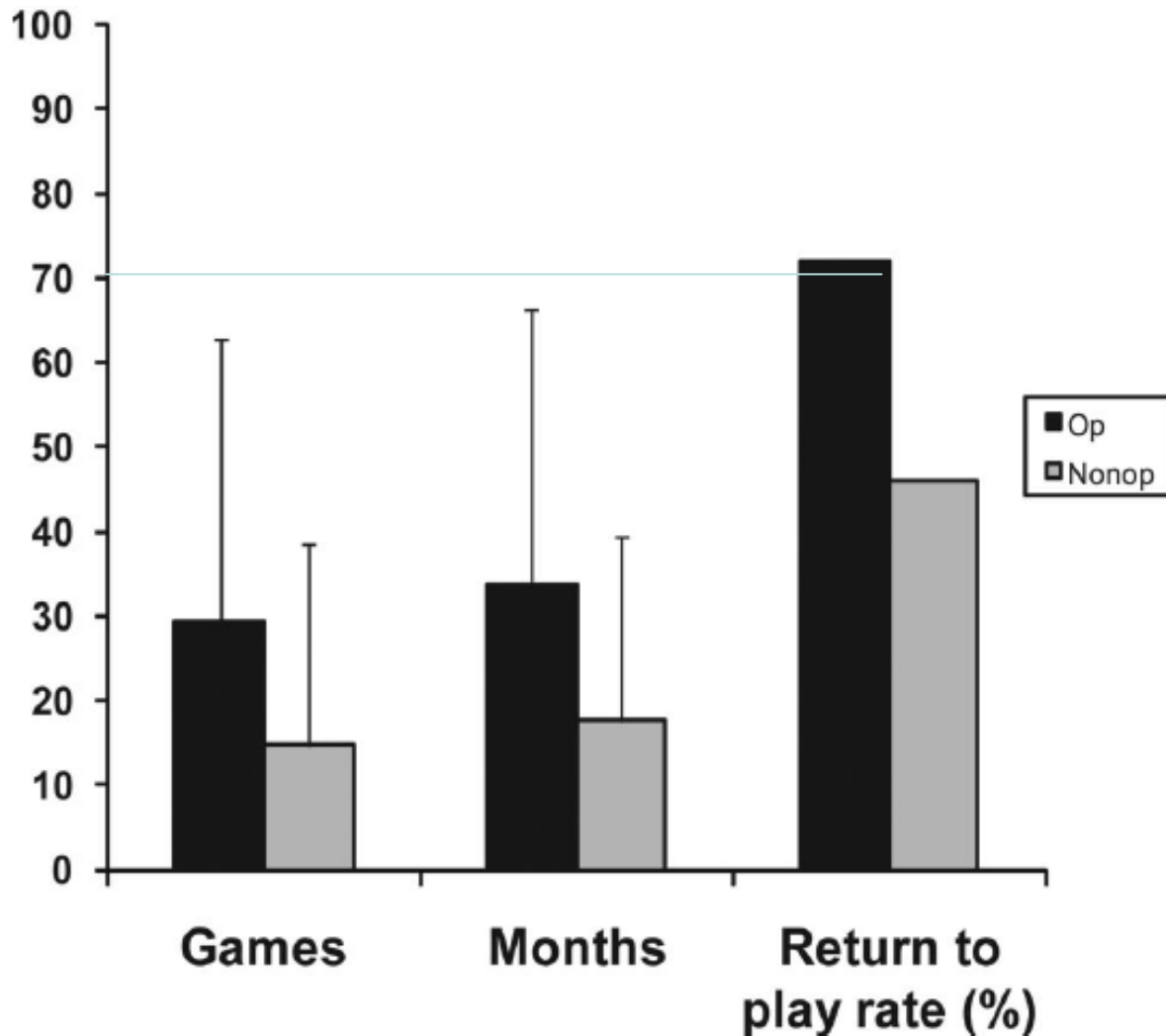


Figure 3. Return-to-play rates and career length in NFL players after operative or nonoperative treatment of a cervical disc herniation. Athletes in the operative cohort demonstrated higher return-to-play rates and longer careers than those from the nonsurgical group. RTP indicates return to play.



# Cervicogenic Headache ?

- Riina J, et al. Cervical Radiculopathy or Myelopathy Associated Headaches. *JBJS* 2009; 91; 1919-23
- From Prospective Study on ACDF vs ADR
- Conclusions: At **two years postoperatively**, patients undergoing **anterior cervical operations**, both those who have an arthroplasty and those who have an arthrodesis, **for cervical radiculopathy and myelopathy** can be expected to have **significant improvement** from baseline with regard to **headache** symptoms.

# JBJS 2009; 91; 1919-23

**TABLE III Distribution of Headache Grades Between Groups Preoperatively and at Twenty-four Months**

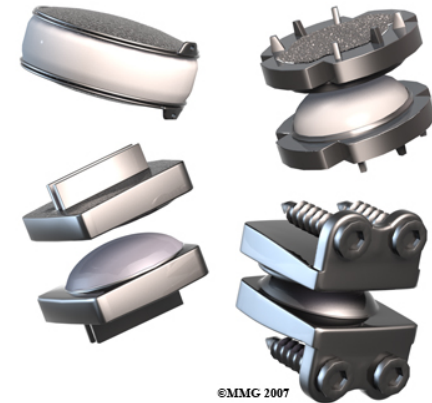
Grade	Group Managed with Arthroplasty		Group Managed with Anterior Cervical Discectomy and Fusion	
	Preop. (N = 518)	24 Mo (N = 430)	Preop. (N = 485)	24 Mo (N = 373)
0	68 (13.13%)	162 (36.67%)	70 (14.43%)	118 (31.64%)
1	85 (16.41%)	123 (28.60%)	83 (17.11%)	108 (28.95%)
2	94 (18.15%)	68 (15.81%)	80 (16.49%)	76 (20.38%)
3	120 (23.17%)	44 (10.23%)	109 (22.47%)	37 (9.92%)
4	91 (17.57%)	21 (4.88%)	78 (16.08%)	22 (5.90%)
5	60 (11.58%)	12 (2.79%)	65 (13.40%)	12 (3.22%)

**TABLE II Headache Question from Neck Disability Index**

Score	Headaches*
0	I have no headaches at all.
1	I have slight headaches that come infrequently.
2	I have moderate headaches that come infrequently.
3	I have moderate headaches that come frequently.
4	I have severe headaches that come frequently.
5	I have headaches almost all of the time.



# Bone and Joint Decade



- **Early results** from trials of **cervical disc arthroplasty** (artificial disc replacement) appear to show **1- to 2-year outcomes** for radicular symptoms that are **similar to** outcomes for **anterior fusion surgery**.
- There is **no evidence** to support the use of cervical disc arthroplasty in patients with **neck pain** who **do not have primary radicular pain**.

# Spine 2011; 36 (3): E203-E212

- **Vignettes** given to (international) Degenerative Spine Study Group SURGEONS (n=17 surgeons)
- **First survey** = recommendations for a **Patient**
- **Second column** = recommendations for **YOUR Family Member**

		Patient	Family
Case 2: Cervical herniated disc	1. Nonoperative treatment	0	2
	2. Surgical decompression	4	5
	3. Surgical decompression with fusion	5	3
	4. Cervical disc replacement	8	6
	5. Other	0	0
Case 3: Cervical spondylotic stenosis	1. Nonoperative treatment	9	7
	2. Surgical decompression	1	0
	3. Surgical decompression with fusion	7	7
	4. Other	0	1

**Bone & Joint Decade: Surgery and Injections:**  
Details: *Spine* 2008; 33 (4S): S153-169

- **31 “Scientifically Admissible” Articles**
  - 27 primary studies, and 4 systematic reviews
  - 17 RCTs, 8 Prospective cohort studies, 2 “extraordinary case series” accepted as scientific.
- Includes detailed analyses of *“Frequently Cited but Scientifically Inadmissible Studies”*
  - Thus, a **useful resource for IME or file review physician** if another physician cites one of these studies as “support” for an intervention. <sup>61</sup>

# Frequently Cited but **Scientifically Inadmissible: Neck Pain**

- Lord SM, Barnsley L, Wallis BJ, et al. Percutaneous **radio-frequency neurotomy** for chronic cervical zygapophyseal-joint pain. *N Engl J Med* 1996;335: 1721–6.
- Garvey T, Transfeldt EEM, Malcolm JRM, et al. Outcome of **anterior cervical discectomy and fusion** as perceived by patients treated for **dominant axial-mechanical cervical spine pain**. *Spine* 2002;27:1887–94.
- Palit M, Schofferman J, Goldthwaite N, et al. Anterior **discectomy and fusion for the management of neck pain**. *Spine* 1999;24:2224–8.
- Simmons EH, Bhalla SK. Anterior cervical discectomy and fusion. A clinical and biomechanical study with eight-year follow-up. *J Bone Joint Surg Br* 1969;51:225–37.
- Whitecloud T, Seago R. **Cervical discogenic syndrome: results of operative intervention** in patients with positive discography. *Spine* 1987;12:313–6.

# Frequently Cited but Scientifically Inadmissible: Neck Pain

- **Although** these studies are **frequently cited** as demonstrating clear efficacy of cervical fusion for primary neck pain, **none of these were found to be scientifically admissible** by the Neck Pain Task Force.
- Instead, after critical review of the methods and data we found **no clinical evidence**, even in the best known studies purporting definitive efficacy, **to support** the use of **either cervical fusion or cervical disc arthroplasty** in patients with **neck pain without radiculopathy** or serious underlying pathology.

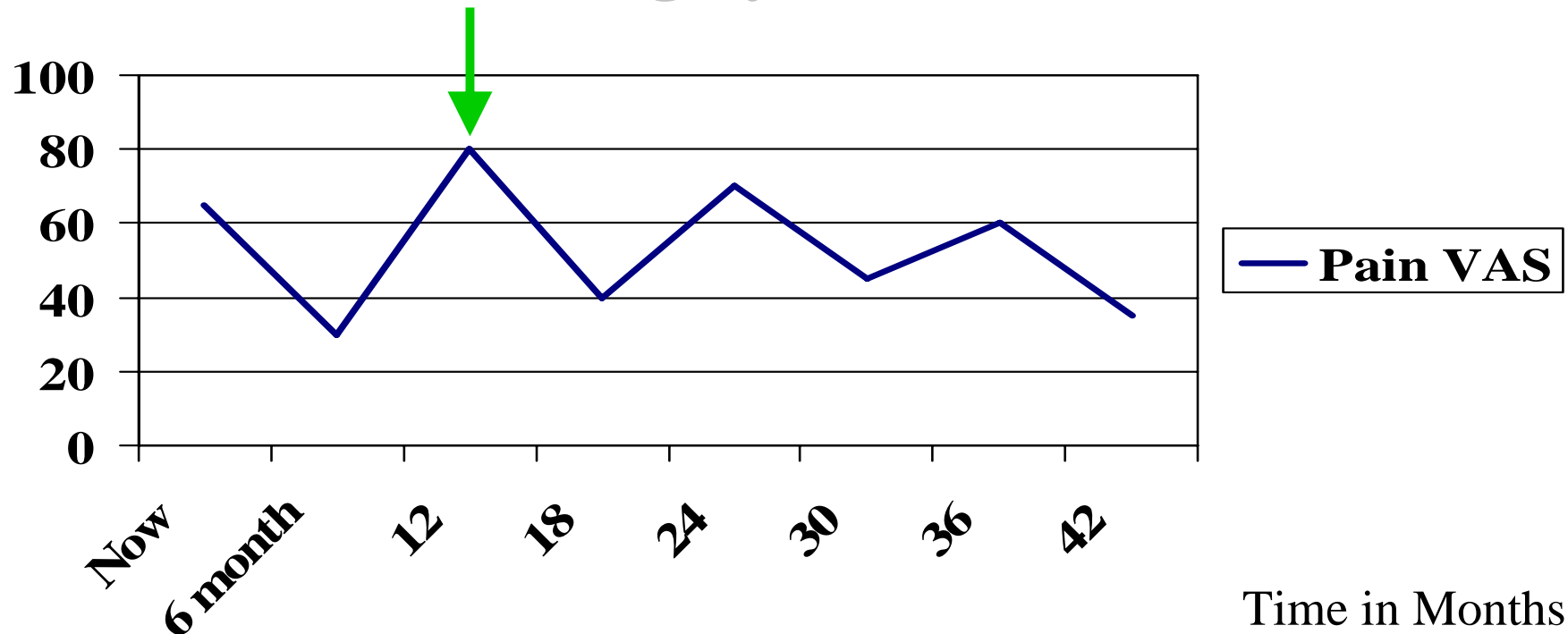
# Frequently Cited but Scientifically Inadmissible: Neck Pain

- It is well documented that neck pain without serious underlying disease shows wide and spontaneous variations—both in severity and any accompanying impairment.
- Thus, **none of these frequently cited, uncontrolled studies can confidently estimate** how much, if any, of the reported improvement was due to a **surgical intervention**, how much was due to **natural history**, and how much might be explained by various nonspecific and **unidentified factors**.



Surgery is done when patients are “at their worst”, assessment is done later, when natural cycling of symptoms would suggest improvement, **even if surgery is ineffective.**

**What if sham surgery is done here?**



Natural cyclic history of back pain getting better and worse

# Real Science: RCTs

**Table 1. Studies Reporting Short- and Medium-Term Validated Outcomes of Open Surgery for Cervical Radiculopathy in Subjects When Followed by Independent Observer at Fixed Follow-Up Points**

First Author (Yr)	Short-Term Outcomes	Medium-Term Outcomes
Hacker <i>et al</i> (2000) <sup>33</sup>	6 mo post-op Mean pain score improved 3/10 (approx. 40%)	2 yr Mean pain score improved 3/10 (approx. 40%)
Baskin <i>et al</i> (2003) <sup>38</sup>	6–12 wk post-op Mean pain score improved 3.5–4.5 (neck) (approx. 60%) 4.5–7 (arm) (approx. 80%)	2 yr Mean pain score improved 4.5–6.5 (neck pain) (approx. 75%) 4.5–7 (arm pain) (approx. 80%)
Hacker (2005) <sup>41</sup>	6–12 wk post-op Mean pain score improved 3.2–4.5 (neck) 3.5–4.8 (arm) PCS of SF-36 12–15 points	1 yr Mean pain score improved 3.4–4.6 (neck) 3.5–4.9 (arm) PCS of SF-36 14–16 points
Coric <i>et al</i> (2006) <sup>42</sup>	12 wk post-op Mean pain score improved 3.2–4.0 (neck) (approx. 55%) 3.6–4.5 (arm) (approx. 65%) NDI Mean NDI improvement 20–28 points (approx. 60%) PCS of SF-36 12–15 points	1 yr Mean pain score improved 3.2–5.0 (neck) (approx. 55%) 3.0–4.8 (arm) (approx. 65%) NDI Mean NDI improvement 22–32 points (75%) PCS of SF-36 15–18 points

NDI indicates neck disability index; PCS, physical component score.

- Hacker RJ, Cauthen JC, Gilbert TJ, et al. A prospective randomized multicenter clinical evaluation of an anterior cervical fusion cage. *Spine* 2000;25: 2646–54.
- Baskin DS, Ryan P, Sonntag V, et al. A prospective, randomized, controlled cervical fusion study using recombinant human bone morphogenetic protein-2 with the CORNERSTONE-SR allograft ring and the ATLANTIS anterior cervical plate. *Spine* 2003;28:1219–25.
- Hacker RJ. Cervical disc arthroplasty: a controlled randomized prospective study with intermediate follow-up results. Invited submission from the joint section meeting on disorders of the spine and peripheral nerves, March 2005. *J Neurosurg Spine* 2005;3:424–8.
- Coric D, Finger F, Boltes P. Prospective randomized controlled study of the Bryan Cervical Disc: early clinical results from a single investigational site. *J Neurosurg Spine* 2006;4:31–5.

**Table 5. Noninvasive Interventions for Whiplash-Associated Disorders (WAD) and Other Neck Disorders, by Type of Population and Likelihood of Being Helpful in the Short Term: The Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders**

Population	Likely Helpful (Worth Considering)	Possibly Helpful (Might Consider)	Likely Not Helpful (Not Worth Considering)	Not Enough Evidence to Make Determination
Acute WAD (Grade I or II neck pain)	Educational video Mobilization Exercises Mobilization + exercises	Pulsed electromagnetic therapy	Pamphlet/neck booklet alone Collars Passive modalities (heat, cold, diathermy, hydrotherapy) Referral to fitness or rehab program Frequent early health-care use <b>Methylprednisolone</b>	Manipulation Traction NSAIDS Other drugs
Non-acute WAD (Grade I or II neck pain)	—	Supervised exercises Coordinated multidisciplinary care	Passive modalities (TENS, ultrasound) Corticosteroid injections	Manipulation Traction NSAIDS Other drugs
Neck pain not associated with WAD (Grade I or II)	Manipulation Mobilization Supervised exercises Manual therapy (manipulation, mobilization, massage) plus exercises Acupuncture Low-level laser therapy Analgesics	Percutaneous neuromodular therapy Brief intervention using cognitive behavioral principles	Advice alone Collars Passive modalities (heat therapy, ultrasound, TENS, electrical muscle stimulation) Exercise instruction Botulinum toxin A	Magnetic stimulation Massage Traction NSAIDS Other drugs
Neck pain with radiation or cervical radiculopathy (Grade III)	—	—	—	All interventions
Cervicogenic headache	—	Manipulation Mobilization Supervised exercises Manipulation or mobilization plus supervised exercises Water pillow	—	Passive modalities Traction NSAIDS Other drugs
Neck pain in workers (Grade I or II)	—	Supervised exercises plus strength or endurance training and/or relaxation training with behavioral support	Ergonomic interventions Forced work breaks Rehabilitation programs Stress management programs Relaxation training Physical training Exercise instruction	—

**Table 2. Best Evidence Synthesis Summary for the Surgical Treatment of Neck Pain and Associated Disorders**

Population	Likely Helpful (Worth Considering)	Possibly Helpful (Might Consider)	Likely Not Helpful (Not Worth Considering)	Not Enough Evidence to Make Determination
Grade IV neck Pain with serious structural pathology (unstable fracture, infection, tumor, vascular injury, <i>etc.</i> )	Beyond the NPTF mandate Aggressive surgical treatment of many of these conditions is generally accepted as effective and often strongly advised. Readers are referred to literature of specific pathological conditions.			
Grade III neck pain (with cervical radiculopathy)	ACD (short-term*)  ACDF (short-term*)	Limited (<4 injections) root or epidural corticosteroid injections (short-term*)  ACDF + instrumentation/cages (short-term*)  Single-level cervical disc replacement† (short-term*)	Thermal heating of the dorsal root ganglion	Multilevel cervical disc replacement (long-term efficacy and safety)  Spinal cord stimulator implantation or implantable intrathecal narcotic pump Disc nucleoplasty or anuloplasty
Grade I or II. Axial neck pain without radiculopathy (without serious underlying structural pathology)	None	None	Corticosteroid injections to cervical facets  RF Neurotomy to cervical facets nerves without confirmed zygapophyseal pain‡ Cervical decompression  Cervical fusion or disc replacement (comorbidities present§)	RF Neurotomy to cervical facets nerves with confirmed zygapophyseal pain <sup>3</sup>  Cervical fusion (comorbidities absent)  Cervical disc replacement <sup>2</sup> Spinal cord stimulator implantation or implantable intrathecal narcotic pump Disc nucleoplasty or anuloplasty

# Table 2 (continued)

**Table 2. (Continued)**

Population	Likely Helpful (Worth Considering)	Possibly Helpful (Might Consider)	Likely Not Helpful (Not Worth Considering)	Not Enough Evidence to Make Determination
WAD-related axial neck pain without fracture, dislocation, or instability	None	None	Corticosteroid injections to cervical facets	RF Neurotomy to cervical facets nerves with confirmed zygapophyseal pain <sup>3</sup>
			RF Neurotomy to cervical facets nerves without confirmed zygapophyseal pain <sup>3</sup>	Craniocervical or upper cervical fusion¶
			Cervical decompression	Cervical fusion comorbidities absent
			Cervical fusion or disc replacement (comorbidities present <sup>4</sup> )	Cervical disc replacement <sup>2</sup>
Cervicogenic headache without serious underlying structural pathology	None	None	Corticosteroid injections to cervical facets	Spinal cord stimulator implantation or implantable intrathecal narcotic pump
				Disc nucleoplasty or anuloplasty

# Table 2 (continued)

**Table 2. (Continued)**

Population	Likely Helpful (Worth Considering)	Possibly Helpful (Might Consider)	Likely Not Helpful (Not Worth Considering)	Not Enough Evidence to Make Determination
Cervicogenic Headache continued			RF Neurotomy to cervical facets nerves without confirmed zygapophyseal pain <sup>3</sup> Cervical decompression  Cervical fusion or disc replacement (comorbidities present <sup>4</sup> )	Craniocervical or upper cervical fusion <sup>5</sup>  Cervical fusion comorbidities absent Cervical disc replacement <sup>2</sup>  Spinal cord stimulator implantation or implantable intrathecal narcotic pump Disc nucleoplasty or anuloplasty

\*Benefit over nonsurgical care is most clearly seen in the first year after surgery.

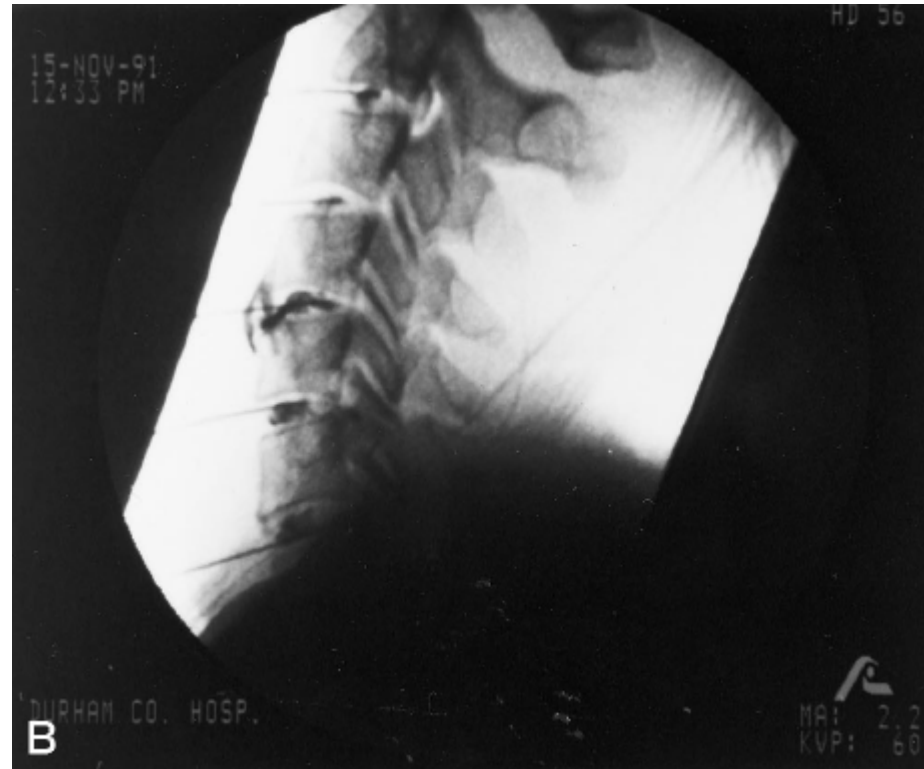
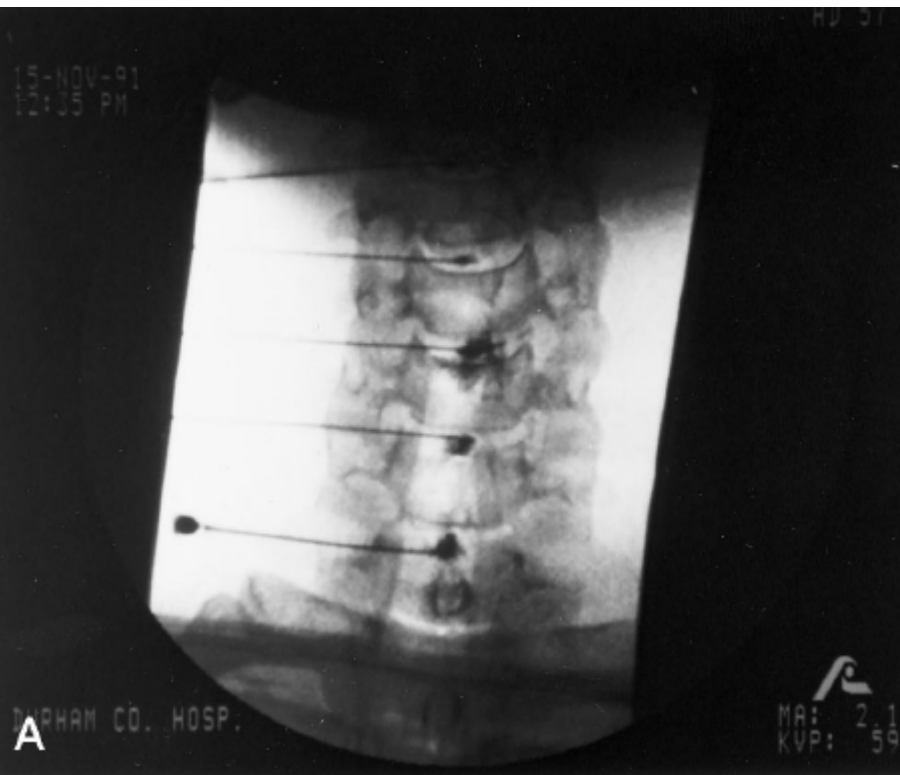
†Safety data for disc replacement not available beyond short-term trials (2 yr). Not enough evidence to determine safety over intended life of disc replacement prosthesis (40 yr). Caution recommended in younger patients and those comorbidities excluded from clinical trials.

‡See "Diagnosis and Assessment" Chapter for validity of zygapophyseal pain diagnostic strategies.

§Comorbidities Cervical pain as part of generalized pain syndrome (e.g., fibromyalgia, somatization disorder, etc.), serious psychological distress or impairment, or metabolic diseases complicating cervical procedures.

¶Upper cervical or craniocervical fusion for asymmetric alar, transverse or other upper cervical ligaments as seen on MRI or functional CT scan (absent radiographic instability).

# CERVICAL DISCOGRAPHY



# ACOEEM Quotes

## Bone and Joint Task Force

- A recent systematic review **did not find any high quality evidence to support cervical discography**, and **did not find** any studies that show discography could **improve clinical outcomes** in patients considering cervical surgery.
  - Nordin M, Carragee E, Hogg-Johnson S, et al. Assessment of neck pain and associated disorders: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine*. 2008;33(4S):S101-22.



- 286 Nassr A, Lee JY, Bashir RS, et al. Does incorrect level needle localization during anterior cervical discectomy and fusion lead to accelerated disc degeneration?  
*Spine.* 2009;34(2):189-92.

**Table 3. Incidence of Disc Degeneration**

	Improved 1 Grade	No Change	Increased 1 Grade	Increased 2 Grades
Correctly marked (N = 72)	1 (1%)	48 (68%)	21 (29%)	2 (2%)
Incorrectly marked (N = 15)	0 (0%)	6 (40%)	9 (60%)	0 (0%)

- **Recommendation: *Discography* for Assessing Acute, Subacute, or Chronic Cervicothoracic Pain or Radicular Pain Syndromes**
  - Discography, whether performed as a solitary test or when paired with imaging (e.g., MRI, CT), is **not recommended** for acute, subacute, or chronic cervicothoracic pain or radicular pain syndromes.
- **Strength of Evidence – *Not Recommended, Insufficient Evidence (I)***

Summary: *Guidelines*  
are a neat way to “wrap up”  
how to treat low back pain,  
**NECK PAIN**, and other problems.

