

Health Policy Review

Review of Occupational Medicine Practice Guidelines for Interventional Pain Management and Potential Implications

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In the modern day environment, workers' compensation costs continue to be a challenge, with a need to balance costs, benefits, and quality of medical care. The cost of workers' compensation care affects all stakeholders including workers, employers, providers, regulators, legislators, and insurers. Consequently, a continued commitment to quality, accessibility to care, and cost containment will help ensure that workers are afforded accessible, high quality, and cost-effective care.

In 2004, workers' compensation programs in all 50 states, the District of Columbia, and federal programs in the United States combined received an income of \$87.4 billion while paying out only \$56 billion in medical and cash benefits with \$31.4 billion or 37% in administrative expenses and profit. Occupational diseases represented only 8% of the workers' compensation claims and 29% of the cost. The American College of Occupational and Environmental Medicine (ACOEM) has published several guidelines; though widely adopted by WCPs, these guidelines evaluate the practice of medicine of multiple specialties without adequate expertise and expert input from the concerned specialties, including interventional pain management.

An assessment of the ACOEM guidelines utilizing Appraisal of Guidelines for Research and Evaluation (AGREE) criteria, the criteria developed by the American Medical Association (AMA), the Institute of Medicine (IOM), and other significantly accepted criteria, consistently showed very low scores (< 30%) in most aspects of the these guidelines.

The ACOEM recommendations do not appear to have been based on a careful review of the literature, overall quality of evidence, standard of care, or expert consensus. Based on the evaluation utilizing appropriate and current evidence-based medicine (EBM) principles, the evidence ratings for diagnostic techniques of lumbar discography; cervical, thoracic, and lumbar facet joint nerve blocks and sacroiliac joint nerve blocks; therapeutic cervical and lumbar medial branch blocks and radiofrequency neurolysis; cervical interlaminar epidural steroid injections, caudal epidural steroid injections, and lumbar transforaminal epidural injections; caudal percutaneous adhesiolysis; abd spinal cord stimulation were found to be moderate with strong recommendation applying for most patients in most circumstances. The evidence ratings for intradiscal electrothermal therapy (IDET), an automated percutaneous disc decompression and also deserve further scrutiny and analysis.

In conclusion, these ACOEM guidelines for interventional pain management have no applicability in modern patient care due to lack of expertise by the developing organization (ACOEM), lack of utilization of appropriate and current EBM principles, and lack of significant involvement of experts in these techniques resulting in a lack of clinical relevance. Thus, they may result in reduced medical quality of care; may severely hinder access to appropriate, medically needed and essential medical care; and finally, they may increase costs for injured workers, third party payors, and the government by transferring the injured worker into a non-productive disability system.

Key words: Guidelines, ACOEM, ASIPP, interventional pain management, interventional techniques, evidence-based medicine, systematic reviews, guideline development, AHCP, AHRQ, IOM, AMA, AGREE, workers' compensation, chronic pain guidelines, low back pain guidelines

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The American College of Occupational and Environmental Medicine (ACOEM) recently completed practice guidelines regarding the treatment of chronic pain and low back pain. Serious concerns regarding the expertise of the convened panel and the validity of its findings has triggered this evaluation.

Milton Friedman pointed out many years ago: "The only social responsibility of business is to increase its profits." This statement is well accepted and summarizes the value system that is at the heart of a capitalistic society such as ours. However, these values cannot be allowed to influence scientific evaluations and the recommendations that flow from them. It is even more important when access to health care for an injured worker could be compromised (1-8). The introduction of workmen's compensation laws was a tremendous social advance, but, unfortunately, it is becoming more apparent in the last few years that the present laws may be manipulated through the misuse and misinterpretation of scientific evidence.

The ACOEM first published its guidelines regarding common health complaints of workers in 1997 (9). In 2004, the college released the second edition of its guidelines (3). Updates to the second edition were published in 2007 to the chapter on low back disorders (10). The chronic pain chapter is still undergoing external peer review (11). These guidelines may prevent injured workers from receiving the majority of the medically necessary and appropriate interventional pain management procedures (12,13). It is difficult to understand why ACOEM even presumes that they are the authority on these issues. The link between many of these conditions and the patients' occupation is hardly solid, and many conditions, such as degenerative disc disease for example, are likely multifactorial and perhaps not even a disease.

An understanding of background information on guideline preparation, quality, and evidence rating is essential, since most guidelines do not meet the criteria for preparation of guidelines (14-60).

This manuscript will provide a critical and comprehensive review of ACOEM guideline synthesis, medical necessity, conflicts of interest, evidence-based medicine principles, and potential implications on the practice of interventional pain management and potential effects on injured workers and various federal programs.

IS EVIDENCE-BASED MEDICINE BASED ON EVIDENCE?

Haynes (61) authored a debate on the kind of evidence that evidence-based medicine (EBM) advocates want health care providers and consumers to pay attention to. Similarly, Sehon and Stanley (62) provided a philosophical analysis of the evidence-based medicine debate. In 1992, evidence-based medicine advocates proclaimed a "new paradigm" in which evidence from health care research was deemed the best basis for decisions for individual patients and health systems. In doing so, evidence-based medicine advocates pitted evidence-based medicine against the traditional knowledge foundation of medicine, where the key elements are an understanding of the basic mechanisms of disease coupled with clinical experience (63-68). A fundamental assumption of evidence-based medicine is that practitioners, whose practice is based on an understanding of evidence from applied health care research, will provide superior patient care compared with practitioners who rely on an understanding of basic mechanisms and their own clinical experience (61). However, there is no evidence-based medicine, or for that matter, any convincing direct evidence that shows that this assumption is correct. Nevertheless, the *New York Times* magazine Year in Review included evidence-based medicine as one of the most influential ideas of 2001 (69).

Evidence-based medicine has long since evolved beyond its initial (mis)conception that evidence-based medicine might replace traditional medicine (61). Consequently, the role of evidence-based medicine is now seen to augment rather than replace individual clinical experience and understanding of basic disease mechanisms. While evidence-based medicine must continue to evolve, it is essential to address a number of issues including scientific underpinnings, moral stance, consequences, and practical matters of dissemination and application (61). In summary, advocates of evidence-based medicine want clinicians and consumers to pay attention to the best findings from health care research that are both valid and ready for clinical application.

Critics of evidence-based medicine claim that, "there is no evidence (and unlikely ever to be) that evidence-based medicine provides better medical care," and evidence-based medicine is simply "following its own political agenda" (66). Other critics use even harsher rhetoric, claiming that "evidence-

based medicine's assumptions are absurd" (67-73). Some commentators claim a middle ground by saying that evidence-based medicine and other approaches should be harmonized (68). Thus, there are multiple and variable opinions on the issue (70-73).

Sehon and Stanley (62) pointed out that the questions raised by this debate are fundamental to the practice of medicine. Consequently, it is essential to understand the basic nature of evidence-based medicine, the alternatives to evidence-based medicine, as well as the relationship between evidence-based medicine and alternative approaches to medicine. Further, it is also fundamental to understand whether or not evidence-based medicine represents a paradigm shift, and if so, the issues in the debate about how medical care can be provided in accordance with the principles of evidence-based medicine, how it should be accomplished, and the way health care dollars should be spent must be addressed.

A current definition of evidence-based medicine is: "the explicit, judicious, and conscientious use of current best evidence from health care research in decisions about the care of individuals and populations" (74). However, a more pragmatic definition is a set of tools and resources for finding and applying current best evidence from research for the care of individual patients (61). This practical definition incorporates the fact that there are now many information resources in which evidence from health care has been pregraded for validity by people with expertise in research methods, and, better still, it has also been assessed by experienced practitioners for clinical relevance (61). To summarize, this simplifies the clinician's task changing from the largely hopeless one of reading all the original medical literature to find out about current best care, to one of finding the right pre-assessed research evidence, judging whether it applies to the health problem at hand, and then working the evidence into the decision that must be made.

Other key components, which include patient circumstances, can only be assessed by the expertise of the clinician and the preferences of the patient (75). It has been vaguely described in the literature how research evidence, clinical circumstance, and patients' preferences are combined and an optimal decision is reached (76). This has only been described as, "clinical judgment and expertise" but it is considered as essential to the success of evidence-based medicine in providing appropriate patient care.

The fundamental questions in evidence-based medicine are:

- ◆ Is the research valid?
- ◆ Are the best findings from this research available?
- ◆ Is this health care research ready for general application?
- ◆ To whom and how does one apply valid and ready evidence from health care research?

Consequently, even though modern evidence-based medicine provides an increasingly sophisticated means for addressing a multitude of questions, at present, the results of any synthesis of evidence-based medicine are only as good as the advocates or developers of evidence-based medicine or guidelines.

At the present time, there is neither evidence that the hierarchy of evidence derived from randomized trials is superior, nor evidence that patients whose clinicians practice evidence-based medicine are better off than those whose clinicians do not practice evidence-based medicine. Thus far, no one has performed a randomized controlled trial (RCT) of EBM with patient outcomes as the measurement of success. Such a trial would be impossible to do since a control group could not be effectively isolated from the research that evidence-based medicine is attempting to transfer, and it would be regarded as unethical to do so (61).

While the arguments about hierarchy of evidence will continue to flourish through the next millennium, it has been shown that the findings of observational studies agree more often than not with the findings of RCTs (77-79). At present, there is no convincing evidence that RCTs are superior to observational studies. Further, we do not understand when a research finding is ready for clinical application. Multiple issues related to this include our primitive understanding of the differences in patient characteristics which preclude utilizing the same research, the same algorithm, the same cookbook medicine applied in the same way, in each or every instance, or not applied at all.

The major disadvantage of RCTs is that the results have limited generalizability to patients, clinicians, and treatment settings different from those in the RCTs (80). In contrast, RCTs emphasize internal validity. Practical or pragmatic clinical trials can address some of the generalizability issues, but can be costly and generally do not address explicitly the underlying organization of care (81,82). Therefore, if practical or pragmatic clinical trials are performed cost effectively, these trials will be the ideal rather than RCTs.

WHAT IS EVIDENCE-BASED MANAGEMENT?

Two components are necessary to improve the quality of medical care: advances in evidence-based medicine (EBM), which identify clinical practices leading to better care, i.e., the content of providing care (83), and knowledge of how to put this content into routine practice (84). These advances in evidence-based management (EBMgt) identify organizational strategies, structures, and management practices that enable physicians and other health care professionals to provide evidence-based care, i.e., the context of providing care (85). Until both components are in place – identifying the best content (EBM) and applying it within effective organizational contexts (EBMgt) – consistent, sustainable improvement in the quality of care received by U.S. residents is unlikely to occur.

The evidence-base comes largely from the social and behavioral sciences, human factors engineering, and the field of health services research. In addition to RCTs, EBMgt uses observational data and approaches such as the PDSA (plan-do-study-act) quality-improvement method for making small-scale changes to improve care (86).

There are many advantages for using EBM and EBMgt together to treat patients with occupational injuries; however, evidence-based guidelines must actually be based on evidence. Consequently, practice and policy recommendations and interventions are needed to bring both components – EBM and EBMgt, the content and the context – together to provide better patient care.

WHAT ARE THE ESSENTIALS OF GUIDELINE DEVELOPMENT?

Clinical practice guidelines are commonly defined as “systematically developed statements to assist the practitioner and patient to make decisions about appropriate health care for specific clinical circumstances” (22). Over the past decade, there has been a surge of interest in the use of clinical practice guidelines, fueled by the discovery of large, unexplained variations in physician practice (81,87-96), documentation of significant rates of inappropriate care (97-106), and an interest in managing health care costs and improving quality (16,17,94-96,107-114). Thus, it has been believed that practice guidelines can improve the quality, appropriateness, and cost-effectiveness of health care (87), and can also serve as valuable educational tools. Consequently, several major medical organizations, including the American Medical Association (AMA),

the Institute of Medicine (IOM), the Canadian Medical Association (CMA), and the Agency for Healthcare Research and Quality (AHRQ) have carefully formulated the methodology for developing scientifically sound guidelines and rating of the strength of evidence (15,17,19-24,87,115,116). Thus, appropriately developed guidelines not only incorporate validity, reliability/reproducibility, clinical applicability, clinical flexibility, and clarity, but also are developed through a multidisciplinary process, with a scheduled review and proper documentation (22). Guidelines attempt to synthesize the evidence in order to provide a wide range of recommendations for making decisions.

The availability of recommendations for clinical practice is not new; they are as old as the teaching of medicine or even the Hippocratic Oath (116). Ever since the modern era of medicine started emphasizing evidence, guidelines have often been called evidence-based guidelines or recommendations. The original purposes for clinical guidelines were outlined by the IOM (24) as illustrated in Table 1.

Thus, evidence-based guidelines were initially aimed at decision-making by clinicians. In the modern era, evidence-based guidelines have been developed for the full range of clinical activities, from prevention through palliation.

Table 1. *The Institute of Medicine (IOM) description of purpose of clinical guidelines.*

- ◆ **Assisting clinical decision-making by patients and practitioners**
- ◆ **Educating individuals or groups**
- ◆ **Assessing and assuring the quality of care**
- ◆ **Guiding allocation of resources for health care**
- ◆ **Reducing the risk of liability for negligent care**

Source: Institute of Medicine, Committee on Quality of Health Care in America. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academy Press, 2001 (Ref. 24)

WHO IS DEVELOPING PRACTICE GUIDELINES?

The guideline movement has spawned an increasing number of “players” who are rapidly developing guidelines, often to serve specific or even proprietary agendas (1,3,10,25-30,117,118).

Government agencies developing guidelines include the AHRQ, the United States Preventive Services Task Force (USPSTF) (52), the National Institutes of Health (NIH), and the Centers for Disease Control and Prevention (CDC). These agencies seek qualified and broadly representative individuals for a committee or task force to independently develop evidence-based guidelines.

Professional societies such as the American College of Surgeons (ACS), the American College of Physicians (ACP), the American Society of Interventional Pain Physicians (ASIPP), and many other clinically oriented organizations have developed pertinent guidelines for their specialties (25-30). However, some organizations have developed guidelines for interventions in which they do not have expertise, solely based on the origin of the problem, such as a work-related injuries or spine-related problems. However, for-profit organizations do not disseminate them, but rather sell them to the insurance industry (117,118).

IS THERE A UNIFORM APPROACH TO GUIDELINE DEVELOPMENT?

Overall, each of the developers has their own approaches, priorities, and at times, their own biases and self-interests (116). Thus, it is important for the consumer to appreciate the authorship of the guidelines to understand that potential conflicts of interest may subtly or not so subtly influence the way the guidelines were developed or structured. Even assuming the best of intentions most of the time, different groups will interpret the evidence differently. Thus, guideline developers with experience and interest in interventional techniques are often inclined to recommend their use, provided the procedures are safe and evidence exists (25-30). Conversely, guideline developers who represent certain agencies will often emphasize a lack of evidence (10,11).

While there is no universally accepted approach to developing and presenting guidelines, the most rigorous approach in widespread use was developed by the AHRQ USPSTF (Table 2) (52).

In contrast, the authors of ACOEM guidelines have utilized an outdated Agency for Healthcare Research and Quality (AHCPR) hierarchy of evidence (extinguished by Congress in 1995), which carries the disclaimer “not for patient care” (119) (Table 3). Grading of recommendations is illustrated in Table 4 as described by Guyatt et al (31). Finally, Atkins et al (51) described the sequential process for the development of guidelines (Table 5).

Table 2. *Quality of evidence developed by AHRQ.*

I	Evidence obtained from at least one properly randomized controlled trial.
II-1	Evidence obtained from well-designed controlled trials without randomization.
II-2	Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.
II-3	Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.
III	Opinions of respected authorities, based on clinical experience descriptive studies and case reports or reports of expert committees.

Adapted from the Agency for Healthcare Research and Quality U.S. Preventive Services Task Force (USPSTF) (Ref. 52)

Table 3. *Outdated quality of evidence criteria utilized by ACOEM (10).*

A	Strong evidence-base: Two or more high-quality studies ⁱ .
B	Moderate evidence-base: At least one high-quality study or multiple moderate-quality studies ⁱⁱ relevant to the topic and the working population.
C	Limited evidence-base: At least one study of moderate quality.
I	Insufficient Evidence: Evidence is insufficient or irreconcilable.

- i. For therapy and prevention, randomized controlled trials (RCTs) with narrow confidence intervals and minimal heterogeneity. For diagnosis and screening, cross-sectional studies using independent gold standards. For prognosis, etiology or harms, prospective cohort studies with minimal heterogeneity.
- ii. For therapy and prevention, a well-conducted review of cohort studies. For prognosis, etiology or harms, a well-conducted review of retrospective cohort studies or untreated control arms of RCTs.

Note: These criteria were derived from the second edition (10). AHCPR was extinguished by Congress in 1995, changing AHCPR to AHRQ. Acute Low Back Pain Guidelines (119) provide a disclaimer “not for patient care.”

Table 4. *Grading recommendations.*

Grade of Recommendation/Description	Benefit vs Risk and Burdens	Methodological Quality of Supporting Evidence	Implications
1A/strong recommendation, high-quality evidence	Benefits clearly outweigh risk and burdens, or vice versa	RCTs without important limitations or overwhelming evidence from observational studies	Strong recommendation, can apply to most patients in most circumstances without reservation
1B/strong recommendation, moderate quality evidence	Benefits clearly outweigh risk and burdens, or vice versa	RCTs with important limitations (inconsistent results, methodological flaws, indirect, or imprecise) or exceptionally strong evidence from observational studies	Strong recommendation, can apply to most patients in most circumstances without reservation
1C/strong recommendation, low-quality or very low-quality evidence	Benefits clearly outweigh risk and burdens, or vice versa	Observational studies or case series	Strong recommendation but may change when higher quality evidence becomes available
2A/weak recommendation, high-quality evidence	Benefits closely balanced with risks and burden	RCTs without important limitations or overwhelming evidence from observational studies	Weak recommendation, best action may differ depending on circumstances or patients' or societal values
2B/weak recommendation, moderate-quality evidence	Benefits closely balanced with risks and burden	RCTs with important limitations (inconsistent results, methodological flaws, indirect, or imprecise) or exceptionally strong evidence from observational studies	Weak recommendation, best action may differ depending on circumstances or patients' or societal values
2C/weak recommendation, low-quality or very low-quality evidence	Uncertainty in the estimates of benefits, risks, and burden; benefits, risk, and burden may be closely balanced	Observational studies or case series	Very weak recommendations; other alternatives may be equally reasonable

Adapted from Guyatt G et al (31). Grading strength of recommendations and quality of evidence in clinical guidelines. Report from an American College of Chest Physicians task force. *Chest* 2006; 129:174-181.

Table 5. *Sequential process for developing guidelines.*

<p>First steps</p> <p>1. <i>Establishing the process</i>—For example, prioritizing problems, selecting a panel, declaring conflicts of interest, and agreeing on group processes</p> <p>Preparatory steps</p> <p>2. <i>Systematic review</i>—The first step is to identify and critically appraise or prepare systematic reviews of the best available evidence for all important outcomes</p> <p>3. <i>Prepare evidence profile for important outcomes</i>—Profiles are needed for each subpopulation or risk group, based on the results of systematic reviews, and should include a quality assessment and a summary of findings</p> <p>Grading quality of evidence and strength of recommendations</p> <p>4. <i>Quality of evidence for each outcome</i>—Judged on information summarized in the evidence profile</p> <p>5. <i>Relative importance of outcomes</i>—Only important outcomes should be included in evidence profiles. The included outcomes should be classified as critical or important (but not critical) to a decision</p> <p>6. <i>Overall quality of evidence</i>—The overall quality of evidence should be judged across outcomes based on the lowest quality of evidence for any of the critical outcomes.</p> <p>7. <i>Balance of benefits and harms</i>—The balance of benefits and harms should be classified as net benefits, trade-offs, uncertain trade-offs, or no net benefits based on the important health benefits and harms</p> <p>8. <i>Balance of net benefits and costs</i>—Are incremental health benefits worth the costs? Because resources are always limited, it is important to consider costs (resource utilization) when making a recommendation</p> <p>9. <i>Strength of recommendation</i>—Recommendations should be formulated to reflect their strength—that is, the extent to which one can be confident that adherence will do more good than harm</p> <p>Subsequent steps</p> <p>10. <i>Implementation and evaluation</i>—For example, using effective implementation strategies that address barriers to change, evaluation of implementation, and keeping up to date</p>
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Adapted from Atkins et al (Ref. 51)

Is the Critical or Essential Methodology Followed?

Oxman et al (32,53,54) provided guidance for critical appraisal of the evidence. West et al (55) reviewed different instruments for critically appraising systematic reviews and found 20 systems concerned with the appraisal of systematic reviews or meta-analysis. The AMA, IOM, CMA, and AHRQ have all formulated methodology for developing scientifically sound guidelines, standardized approaches have also

been developed to evaluate the development and validity of guidelines (15,33-40,120-122). Surprising results have been observed following the evaluation of many guidelines. Shaneyfelt et al (15) evaluated 279 guidelines, published from 1985 through June 1997, produced by 69 different developers. There was no difference in the mean number of standards satisfied by guidelines produced by subspecialty medical

societies, general medical societies, or governmental agencies. Mean overall adherence to standards by each guideline was 43.1%, mean adherence to methodological standards on guidance development and format was 51.1%, mean adherence to identification and summary of evidence was 33.6%, and mean adherence was 46% for formulation of recommendations. Overall, mean adherence to standards by each guideline improved from 36.9% in 1985 to 50.4% in 1997.

The *Occupational Medicine Practice Guidelines* by ACOEM, were evaluated utilizing the AGREE evaluation (41) and other validated and widely applied methods (14). Cates et al (41) evaluated the ACOEM guidelines and concluded that the ACOEM guidelines scored low in stakeholder involvement with a score of 46.06%, rigor of development with a score of 26.59%, application with a score of 31.48%, and editorial independence with a score of 29.17%, with scope and purpose scoring 79.63%, and clarity and presentation scoring 86.81%. Manchikanti et al (14) provided critical appraisal of 2007 guidelines and revisions (10,11) utilizing AGREE evaluation criteria, AMA, IOM, and Shaneyfelt et al's criteria (15) for guidelines. Based on the AGREE instrument, Manchikanti et al (14) concluded that the ACOEM guidelines scored less than 10% in stakeholder involvement – domain 2, application – domain 5, and editorial independence – domain 6 with 6.25%, 8.33%, and 4.7%. They also had a score of less than 20% in rigor of development – domain 3, with a score of 18.45%, and less than 40% for clarity and presentation – domain 4, with a score of 34.37%. The only domain with a score higher than 50 was scope and purpose – domain 1, with a score of 73.61%.

Helm (42) concluded that ACOEM complied with only 12 out of the 25 criteria described by Shaneyfelt et al (15). Manchikanti et al (14) also evaluated ACOEM's revised chapters (10,11) utilizing Shaneyfelt et al's criteria (15), which met 7 of 25 (28%) total criteria. Further, the met criteria were: 40% for standards of guidelines, development, and format; 20% for standards of evidence, identification, and summary; and 20% on the standards on the formulation of recommendations.

The Institute for Civil Justice and RAND Health (40) evaluated the technical quality of ACOEM guidelines with the AGREE instrument. This study found the

validity of ACOEM guidelines for the physical modalities and the remaining content uncertain except for surgical content.

Manchikanti et al (14) also appraised the 2007 guidelines, low back and chronic pain chapters (10,11), utilizing the key attributes described by AMA (19) and IOM (22). Based on AMA's key attributes of guidelines (19), ACOEM guidelines met only 1 of the 6 criteria, whereas based on 8 key attributes by IOM (22), they met the criteria in only 3 of the 8 key attributes. Criteria were not met for Validity, Reliability/Reproducibility, Multidisciplinary Process, and Documentation, whereas, criteria were met for Clinical Applicability, Clinical Flexibility, and Schedule Review.

What Are Basic Principles and Critical Elements?

The National Health and Medical Research Council (NHMRC) (43) described 9 basic principles in the development of guidelines. Shaneyfelt et al (15) outlined 25 criteria, whereas AGREE described 5 domains with 23 criteria (35-37). The Guidelines for Guidelines developed in a World Health Organization (WHO) series identified 19 components (44). Other literature available in assisting guideline preparation is extensive (34,44,45,123-125). The IOM in *Clinical Practice Guidelines: Directions for a New Program* (22) described 8 attributes of good practice guidelines. NHRMC (43) described the following 9 basic principles

- Outcomes (survival rates to quality-of-life attributes)
- Best available evidence (according to its quality, relevance, and strength)
- Appropriate systems to synthesize the available evidence (judgment, experience, and good sense)
- Multidisciplinary process of development
- Flexibility and adaptability
- Cost-effectiveness of treatments
- Appropriate dissemination
- Evaluation of implementation and impact of guidelines
- Appropriate revision of the guidelines on a regular basis

Table 6 illustrates the essential components required for guidelines derived from various commonly used evaluation instruments (AGREE, AMA, IOM, and Shaneyfelt et al's criteria) (15,19,22,122).

Table 6. Illustration of the essential components required for guidelines derived from multiple evaluation instruments.

AGREE (122)	AMA (19)	IOM (22)	SHANEYFELT ET AL (15)
I. Scope And Purpose	I. Organization	I. Validity	I. Standards of Guidelines Development and Format
<ol style="list-style-type: none"> 1. The overall objective(s) of the guideline is(are) specifically described. 2. The clinical question(s) covered by the guideline is (are) specifically described. 3. The patients to whom the guideline is meant to apply are specifically described. 	Practice guidelines should be developed by or in conjunction with physician organizations	Practice guidelines are valid if, when followed, they lead to the health and cost outcomes projected for them, other things being equal.	<ol style="list-style-type: none"> 1. Purpose of the guideline is specified. 2. Rationale and importance of the guideline are explained. 3. The participants in the guideline development process and their areas of expertise are specified. 4. Targeted health problem or technology is clearly defined. 5. Targeted patient population is specified. 6. Intended audience or users of the guideline are specified. 7. The principal preventive, diagnostic, or therapeutic options available to clinicians and patients are specified 8. The health outcomes are specified. 9. The method by which the guideline underwent external review is specified. 10. An expiration date or date of scheduled review is specified.
II. Stakeholder Involvement	II. Methodology	II. Reliability/ Reproducibility	II. Standards Of Evidence Identification And Summary
<ol style="list-style-type: none"> 4. The guideline development group includes individuals from all the relevant professional groups. 5. The patients' view and preferences have been sought. 6. The target users of the guideline are clearly defined. 7. The guideline has been piloted among target users. 	Reliable methods that integrate relevant research findings should be used to develop practice guidelines.	Practice guidelines are reliable and reproducible (1) if—given the same evidence and methods for guidelines development—another set of experts would produce essentially the same statements and (2) if—given the same clinical circumstances—the guidelines are interpreted and applied consistently by practitioners or other appropriate parties.	<ol style="list-style-type: none"> 11. Method of identifying scientific evidence is specified. 12. Time period from which evidence is reviewed is specified. 13. The evidence used is identified by citation and referenced. 14. Method of data extraction is specified. 15. Method for grading or classifying the scientific evidence is specified. 16. Formal methods of combining evidence or expert opinion are used and described. 17. Benefits and harms of specific health practices are specified. 18. Benefits and harms are quantified. 19. The effect on health care costs from specific health practices is specified. 20. Costs are quantified.
III. Rigor of Development	III. Clinical Expertise	III. Clinical Applicability	III. Standards on the Formulation of Recommendations
<ol style="list-style-type: none"> 8. Systematic methods were used to search for evidence. 9. The criteria for selecting the evidence are clearly described. 10. The methods used for formulating the recommendations are clearly described. 11. The health benefits, side effects, and risks have been considered in formulating the recommendations. 12. There is an explicit link between the recommendations and the supporting evidence. 13. The guideline has been externally reviewed by experts prior to its publication. 14. A procedure for updating the guideline is provided. 	Appropriate clinical expertise should be used to develop practice guidelines.	Practice guidelines should be as inclusive of appropriately defined patient populations as scientific and clinical evidence and expert judgment permit, and they should explicitly state the populations to which statements apply.	<ol style="list-style-type: none"> 21. The role of value judgments used by the guideline developers in making recommendations is discussed. 22. The role of patient preferences is discussed. 23. Recommendations are specific and apply to the stated goals of the guideline. 24. Recommendations are graded according to the strength of the evidence. 25. Flexibility in the recommendations is specified.

Table 6 (cont.). *Illustration of the essential components required for guidelines derived from multiple evaluation instruments.*

AGREE (122)	AMA (19)	IOM (22)	SHANEYFELT ET AL (15)
<p>IV. Clarity And Presentation</p> <p>15. The recommendations are specific and unambiguous. 16. The different options for management of the condition are clearly presented. 17. Key recommendations are easily identifiable. 18. The guideline is supported with tools for application.</p>	<p>IV. Comprehensiveness</p> <p>Practice guidelines should be as comprehensive and specific as possible.</p>	<p>IV. Clinical Flexibility</p> <p>Practice guidelines should identify the specifically known or generally expected exceptions to their recommendations.</p>	
<p>V. Applicability</p> <p>19. The potential organizational barriers in applying the recommendations have been discussed. 20. The potential cost implications of applying the recommendations have been considered. 21. The guideline presents key review criteria for monitoring and/or purposes. 22. The guideline is editorially independent from the funding body.</p>	<p>V. Current Information</p> <p>Practice guidelines should be based on current information.</p>	<p>V. Clarity</p> <p>Practice guidelines should use unambiguous language, define terms precisely, and use logical, easy-to-follow modes of presentation.</p>	
<p>VI. Editorial Independence</p> <p>23. Conflicts of interest of guideline development members have been reported.</p>	<p>VI. Dissemination</p> <p>Practice guidelines should be widely disseminated.</p>	<p>VI. Multidisciplinary Process</p> <p>Practice guidelines should be developed by a process that includes participation by representatives of key affected groups. Participation may include serving on panels that develop guidelines, providing evidence and viewpoints to the panels, and reviewing draft guidelines.</p>	
		<p>VII. Scheduled Review</p>	
		<p>Practice guidelines should include statements about when they should be reviewed to determine whether revisions are warranted, given new clinical evidence or changing professional consensus.</p>	
		<p>VIII. Documentation</p> <p>The procedures followed in developing guidelines, the participants involved, the evidence used, the assumptions and rationales accepted, and the analytic methods employed should be meticulously documented and described.</p>	

Adapted and modified from AGREE (122), AMA (19), IOM (22), and Shaneyfelt et al (15).

OCCUPATIONAL MEDICINE PRACTICE GUIDELINES BY ACOEM

In response to a barrage of criticism, not only from multiple societies, but also Congress (5), the President of ACOEM acknowledged the concerns of Congress and explained that ACOEM guidelines were rigorous and evidence-based (12).

Evolution of ACOEM's Relationship with Industry

Ladou et al (6) in 2007 exposed the ACOEM and its relationship to industry as a professional association in service to industry. The ACOEM evolved from its organization in 1915 as a professional association of physicians concerned with health hazards in the workplace, then named the American Association of Industrial Physicians and Surgeons (126), to the present American College of Occupational and Environmental Medicine. However, now, as then, most of the officers and directors of ACOEM are either in academic settings or an elite group of full-time medical directors of insurance companies and industrial corporations (6,127,128). The ACOEM also evolved as a political and legislative force in 1967 with the appointment of an advisory committee to influence Congress on the Occupational Safety and Health Act (OSHA), asserting itself as an advocate of limited regulation and enforcement of occupational health and safety standards and laws and environmental protection (6).

Costs and Consequences of the Workers' Compensation System

ACOEM has been described as the principle organization of occupational physicians in the United States, aka, workers' compensation medicine (6,129). Workers' compensation programs in the 50 states and the District of Columbia and federal programs in the United States combined paid \$56 billion in medical and cash benefits in 2004, an increase of 2.3% over 2003 payments. Of that total, it has been reported that \$26.1 billion was for medical care and \$29.9 billion was for cash benefits. Employers' assessed costs for workers' compensation in 2004 were \$87.4 billion, an increase of 7% over 2003 spending. Proponents of cost cutting report that, as a source of support for disabled workers, workers' compensation is currently surpassed in size only by Social Security Disability Insurance, which covers impairments of any cause that are significant, long-term, and impediments to work (130). However, what is ignored is that most workers who do not return to work become eligible for Social Security Disability Insurance, and thus also depend on state and federal programs for medical care. There is

also a wide discrepancy in the cost to the employers for workers' compensation programs versus the cost of the programs (\$87.4 billion vs \$56 billion a year – a 37% or \$31.4 billion administrative expense and profit margin). In addition, occupational diseases represented only 8% of the claims and 29% of the cost (131). Overall, injuries were more costly than occupational diseases.

Balancing Costs vs. Quality and Access

In spite of well-meaning efforts by employers, workers, and providers, workers' compensation costs paid into the system are soaring (132). Workers' compensation rates are increasing astronomically, while at the same time access to medical care and benefits are rapidly decreasing. Base rates, which are used by insurers to determine premiums, are rising in a number of states, with some seeing double-digit increases of as high as 20% per year. This is a paradoxical response illustrating major deficiencies in the workers' compensation system and its management (133).

Workers' compensation costs continue to be a challenge. Thus, there is a need to balance cost control with ensuring benefit adequacy and quality of medical care (133). The cost of workers' compensation care affects all stakeholders including workers, employers, providers, state workers' compensation regulators, legislatures, and insurers, as well as the public, since these costs must be transferred eventually to the consumer. Consequently, a continued commitment to quality, accessibility to care, and cost containment, as well as being alert to emerging issues that can affect these elements, will help ensure that workers are afforded accessible, high quality, and cost-effective care (134).

Business of Guidelines

The ACOEM developed guidelines to formulate the practice of medicine that is acceptable to the insurance industry, *Occupational Medicine Practice Guidelines* as the "gold standard" in effective occupational medical practice (135,136). The RAND Corporation performed a rigorous review of the ACOEM practice guidelines and concluded that, "the evidence base for treatment recommendations for non-surgical conditions were of uncertain validity and comprehensiveness" (40). Nonetheless, in March 2004, the ACOEM practice guidelines were implemented in California on an interim basis. Since that time, RAND reports that payors appear to be interpreting and applying the ACOEM guidelines inconsistently, suggesting that this allows cost savings, not quality of care, to be the primary results of its adoption (40).

Conflicts of Interest

Many complaints regarding the ACOEM guidelines surround conflicts of interest. A review by Cates et al (41) reported that there was unanimous agreement that the guidelines did not address possible conflicts of interest. Manchikanti et al (14) felt that the ACOEM guidelines strongly reflected the biases of the guideline authors. In general, guidelines have been questioned on various fronts based on pharmaceutical and medical device company sponsorship, when members of the guideline committee have substantial financial associations with the industry and the relationship of the developing organization to the industry when there is no relevant relationship or expertise in developing the guidelines except for the sole purpose of financial gain (1-15,60). Hasenfeld and Shekelle (38) in evaluating the methodological quality of guidelines looked at 685 disclosure statements by the authors of guidelines and found that only 35% declared a potential financial conflict of interest. Consequently, conflict management is an essential part of guideline preparation. A conflict of interest exists when an individual's secondary interest, either personal or financial, interferes with or influences judgments regarding the individual's primary interests, such as patient welfare, education, research integrity, etc. (137). Further, there is substantial evidence that industry funding for research is associated with favorable outcomes for the sponsor (47,138-141) and the financial ties of the investigators with their sponsors, such as stock ownership, consulting income, etc., are also associated with favorable research outcomes for the sponsor (141).

Many conflicts arise from the fact that employees and insurance companies fund occupational health services, and these entities have overlapping, yet distinct, interests (142-144). It has been stated that examples of intellectual and moral independence in occupational and environmental medicine are rare in today's environment and it is difficult to find an occupational physician with the temerity to speak out on behalf of workers (6).

Financial conflict with incentives is illustrated by the fact that ACOEM sells these guidelines as a product to states, insurers, and large employers and actively promotes as restrictive treatment guidelines – with the force of law – to state regulations/work compensation agencies. At the same time, these guidelines are not easily available to physicians and the general public.

The Updated Changes

A joint position statement on the ACOEM low back and chronic pain chapters (10,11) issued by American Academy of Pain Medicine (AAPM), ASIPP, International Spine Intervention Society (ISIS), Neuromodulation Therapy Access Coalition (NTAC), and the North American Neuromodulation Society (NAMS) (145) pointed out a number of flaws that these societies felt had to be addressed before the ACOEM guidelines would serve as a credible tool to guide clinical decisions.

1. Extremely limited expert review of pain-related tests, therapies, and interventions
2. Elimination of approximately 50 percent of tests, therapies, and interventions
3. Incomplete and outdated evidence
4. Inconsistencies in the application of ACOEM's evidence-ranking criteria
5. Sale and competitive positioning of ACOEM guidelines

Physician specialty societies develop guidelines to improve care, reduce cost through increased transparency, and accountability in the delivery of medical care. Increasingly, ACOEM has been at odds by developing guidelines for multiple subjects in which they are not experts.

POTENTIAL IMPLICATIONS

Clinical practice guidelines have potential implications in assisting practitioner and patient decisions about appropriate healthcare for specific clinical circumstances (22). Consequently, properly developed guidelines are expected to improve the quality, appropriateness, and cost-effectiveness of healthcare (87). Further, appropriately developed clinical practice guidelines also serve as valuable educational tools and reduce unexplained variations in physician practices. However, the process utilized by ACOEM guidelines in development was without validity, reliability, and reproducibility, clinical applicability, clinical flexibility, clarity, multidisciplinary process, and documentation.

The revised chapters of ACOEM guidelines for interventional pain management (10,11), including low back pain and chronic pain, developed by the ACOEM, have not utilized the principles of evidence-based medicine, systematic reviews, and guideline development. Consequently, strength of evidence for both chapters of the guidelines evaluated by multiple means utilizing AMA criteria (19), IOM criteria (22),

the criteria developed by Shaneyfelt et al (15), and based on AGREE evaluation (122) were inadequate in almost all aspects (14).

ACOEM guidelines on low back pain and chronic pain chapters met only 3 of the 8 attributes of good practice guidelines as developed by the IOM based on the congressional mandate (14). ACOEM guidelines have also scored consistently low on AGREE evaluation in the past (14,41). Of the 6 domains described in AGREE evaluation the average scores for chronic pain and low back pain chapters fell below 50% in 5 of the 6 domains and below 10% in 3 of the 6 domains. RAND study (40) concluded that the evidence base for treatment recommendations for non-surgical conditions were of uncertain validity and comprehensiveness. Finally, in the evaluation (14) utilizing AMA's key attributes (19) and Shaneyfelt et al's criteria (15), the scores were low meeting only 1 of 6 described attributes of AMA and 7 of 25 criteria by Shaneyfelt et al.

Consequently, the ACOEM guidelines reflect the very conservative view of one professional society, not considered expert in most of the areas reviewed. Further, authors of the guidelines also used criteria in evidence search, synthesis, and linkage with clinical application, not generally accepted. Narrowly defined consensus opinions and conclusions do not recommend the vast majority of widely accepted, evidence-supported treatments, procedures, or tests that are currently covered under Medicare, Medicaid, most commercial policies, many other sets of guidelines, and have been practiced for long periods of time over the years.

The ACOEM guidelines as they have been written and are being applied at the present time may be deleterious to the workers' compensation system due to the lack of balance between cost control, adequacy of benefits, and quality medical care. This may impede patient access, increase pain and suffering, and increase costs of medical care for non-workers' compensation insurers and governmental agencies.

A reassessment and reevaluation (48) of the low back pain and chronic pain chapters of ACOEM guidelines (10,11), utilizing the same criteria as ACOEM, presents results that are different from the published and proposed guidelines. The vastly different results in this evaluation (48) illustrated the differences in strength of rating for the diagnosis of discogenic pain by provocation discography, facet joint pain by diagnostic facet joint nerve blocks, and sacroiliac joint pain by diagnostic sacroiliac joint nerve blocks. Similarly for therapeutic

techniques, therapeutic cervical and lumbar medial branch blocks and radiofrequency neurolysis, cervical interlaminar epidural steroid injections, caudal epidural steroid injections, lumbar transforaminal epidural injections, percutaneous adhesiolysis, and spinal cord stimulation presented with moderate evidence and strong recommendation applying for most patients in most circumstances (31,48). Further, the evidence rating for intradiscal electrothermal therapy, automated percutaneous disc decompression, and intrathecal therapy also deserves additional analysis (48).

CONCLUSION

A fundamental goal of guideline formulation is to improve quality. It is to inform and enlighten any and all of the involved parties and this includes the public. The use of guidelines to promote policy implementation or that leads to much less restrictive standards of care violates the central tenet behind the development of such guidelines. To then restrict access to the guidelines by making them only available for sale further diminishes their validity.

ACOEM guidelines (10,11) have not utilized essentials of evidence-based practice contingent upon 4 basic and important aspects:

- ◆ Recognition of the patient's problem and the construction of the structured clinical question
- ◆ Thorough search of medical literature to retrieve the best available evidence to answer the question
- ◆ Critical appraisal of all available evidence; and
- ◆ Integration of the evidence with all aspects and context of the clinical circumstances to facilitate the decision process that determines the best clinical care of each patient.

The ACOEM guidelines (10,11) have not followed the sequential process for developing guidelines as described by Atkins et al (51) and illustrated in Table 5. Specifically, the preparatory steps with systematic review(s) and preparation of evidence profile for important outcomes has not been utilized. In addition, grading quality of evidence and strength of recommendations utilizing 6 steps has not been described. Finally, implementation and evaluation has not been documented. Thus, the guidelines are not expert driven and specialty-area focused, are not meant to guide and inform the practice within the specialty; are without broad-based meta-analysis; are focused on a range of interventions not within the realm of occupational medicine; included a small panel of clinicians selected

by ACOEM; there was no inclusion of national medical societies in external review, much less on the author panel; and about 50% of ACOEM recommendations are based on consensus of that panel without direct connection to purported levels of evidence and ACOEM's 11-point evidence ranking criteria. The guidelines are promoted as a commercial product by sale as a product to states, insurers, and large employers; promoted as the basis for policy implementation; and actively promoted by ACOEM as restrictive treatment guidelines – with the force of law – to state regulators/workers' compensation agencies

In summary, ACOEM's process of guideline synthesis is not consistent with accepted practices by national medical societies for evidence-based guidelines and these guidelines are highly controversial among physician societies and workers. Thus, implementation of these guidelines for interventional pain management may not be applicable for patient care due to numer-

ous deficiencies as explained above. Finally, these guidelines may restrict the independent professional practice of medicine; may result in reduced quality of medical care; will severely hinder access to appropriate, medically needed, and essential medical care; and may increase costs for injured workers, third party payors, and the government by transferring the injured worker into a non-productive disability system.

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REFERENCES

- Egilman DS. Suppression bias at the *Journal of Occupational and Environmental Medicine*. *Int J Occup Environ Health* 2005; 11:202-204.
- Letter to Robert K. McLellan, MD, President of the American College of Occupational & Environmental Medicine (ACOEM) from the American Academy of Pain Medicine, American Society of Interventional Pain Physicians, International Spine Intervention Society, and North American Neuromodulation Society. January 22, 2008.
- Glass LS, Harris JS; American College of Occupational and Environmental Medicine (ACOEM). *Occupational Medicine Practice Guidelines: Evaluation and Management of Common Health Problems and Functional Recovery of Workers, Second Edition*. OEM Press, Beverly Farms, 2004.
- Genovese E. "Evidence" versus "science" in practice guidelines. *APG Insights* 2007; 3:1-12.
- Letter to Robert K. McLellan, MD, President of the American College of Occupational & Environmental Medicine (ACOEM) from the Honorable Bart Stupak and Ed Whitfield, US House of Representatives, January 25, 2008.
- Ladou J, Teitelbaum DT, Egilman DS, Frank AL, Kramer SN, Huff J. American College of Occupational and Environmental Medicine (ACOEM): A professional association in service to industry. *Int J Occup Environ Health* 2007; 13:404-426.
- Greenberg M. Commentary on effects of exposure to industry influence on ACOEM. *Int J Occup Environ Health* 2007; 13:427.
- Tong S, Olsen J. The threat to scientific integrity in environmental and occupational medicine. *Occup Environ Med* 2005; 62:843-846.
- Harris JS, Blais BR; American College of Occupational and Environmental Medicine (ACOEM). *Occupational Medicine Practice Guidelines: Evaluation and Management of Common Health Problems and Functional Recovery in Workers, First Edition*. OEM Press, Beverly Farms, 1997.
- American College of Occupational and Environmental Medicine (ACOEM) Low Back Disorders. In *Occupational Medicine Practice Guidelines: Evaluation and Management of Common Health Problems and Functional Recovery of Workers, Second Edition*. OEM Press, Beverly Farms, 2007.
- American College of Occupational and Environmental Medicine (ACOEM) Chronic Pain. In *Occupational Medicine Practice Guidelines: Evaluation and Management of Common Health Problems and Functional Recovery of Workers, Second Edition*. OEM Press, Beverly Farms; awaiting publication.
- Response Letter from Robert K. McLellan, MD, President of the American College of Occupational & Environmental Medicine (ACOEM) to the Honorable Bart Stupak and Ed Whitfield US House of Representatives. February 5, 2008.
- Response Letter from Robert K. McLellan, MD, President of the American College of Occupational & Environmental Medicine (ACOEM) to Todd Sitzman, MD, MPH, President, American Academy of Pain Medicine; Andrea Trescot, MD, President, American Society of Interventional Pain Physicians; Milton Landers, DO, PHD, President, International Spine Intervention Society; Jaimie Henderson, MD, President, North American Neuromodulation Society; and Joshua Prager, MD, Past President, North American Neuromodulation Society. February 19, 2008.
- Manchikanti L, Singh V, Helm S, Trescot AM, Hirsch JA. A critical appraisal of 2007 American College of Occupational and Environmental Medicine (ACOEM) practice guidelines for interventional pain management: An independent review utilizing AGREE, AMA, IOM, and other criteria. *Pain Physician* 2008; 291-310.
- Shaneyfelt TM, Mayo-Smith MF, Rothwangl J. Are guidelines following guidelines? The methodological quality of clinical practice guidelines in the peer reviewed medical literature. *JAMA* 1999; 281:1900-1905.
- Woolf SH. Practice guidelines: A new reality in medicine. I. Recent developments. *Arch Intern Med* 1990; 150:1811-1818.
- Evidence-based Practice Centers Partner's Guide. Prepared for Agency for Healthcare Research and Quality by the EPC Coordinating Center. January 2005. www.ahrq.gov/Clinic/epcpartner/epcpartner.pdf
- Berg AO, Atkins D, Tierney W. Clinical practice guidelines in practice and education. *J Gen Intern Med* 1997; 12:S25-S33.
- American Medical Association, Office of Quality Assurance. *Attributes to Guide the Development and Evaluation of Practice Parameters*. American Medical Association, Chicago, 1990.
- Canadian Medical Association. *Quality of Care Program: The Guidelines for Canadian Clinical Practice Guidelines*. Canadian Medical Association, Ottawa, Ontario, 1993.
- Woolf SH. *Manual for Clinical Practice Guideline Development*. Rockville, MD. Agency for Health Care Policy and Research, AHCPH publication 91-0007, 1991.
- Field MJ, Lohr KN, eds. *Clinical Practice Guidelines: Directions for a New Program*. Institute of Medicine, National Academy Press, Washington, DC, 1990.
- www.guideline.gov/resources/guideline_resources.aspx
- Institute of Medicine, Committee on Quality of Health Care in America. *Crossing the Quality Chasm: A New Health System for the 21st Century*. National Academy Press, Washington, DC, 2001.
- Boswell MV, Trescot AM, Datta S, Schultztz DM, Hansen HC, Abdi S, Sehgal N, Shah RV, Singh V, Benyamin RM, Patel VB, Buenaventura RM, Colson JD, Corder HJ, Epter RS, Jasper JF, Dunbar EE, Atluri SL, Bowman RC, Deer TR, Swicegood JR, Staats PS, Smith HS, Burton AW, Kloth DS, Giordano J, Manchikanti L. Interventional techniques: Evidence-based practice guidelines in the management of chronic spinal pain. *Pain Physician* 2007; 10:7-111.
- Trescot AM, Helm S, Hansen H, Benjamin R, Adlaka R, Patel S, Manchikanti L. Opioids in the management of chronic non-cancer pain: An update of American Society of Interventional Pain Physicians' (ASIPP) Guidelines. *Pain Physician* 2008; 11:S5-S62.
- Trescot AT, Boswell MV, Alturi SL, Hansen HC, Deer TR, Abdi S, Jasper JF, Singh V, Jordan AE, Johnson BW, Cicala RS, Dunbar EE, Helm S, Varley KG, Suchdev PK, Swicegood JR, Calodney AK, Ogoke BA, Minore WS, Manchikanti L. Opioid guidelines in the management

- of chronic non-cancer pain. *Pain Physician* 2006; 9:1-40.
28. Boswell MV, Shah RV, Everett CR, Sehgal N, McKenzie-Brown AM, Abdi S, Bowman RC, Deer TR, Datta S, Colson JD, Spillane WF, Smith HS, Lucas-Levin LF, Burton AW, Chopra P, Staats PS, Wasserman RA, Manchikanti L. Interventional techniques in the management of chronic spinal pain: Evidence-based practice guidelines. *Pain Physician* 2005; 8:1-47.
 29. Manchikanti L, Staats PS, Singh V, Schultz DM, Vilims BD, Jasper JF, Kloth DS, Trescot AM, Hansen HC, Falasca TD, Racz GB, Deer T, Burton AW, Helm S, Lou L, Bakhit CE, Dunbar EE, Atluri SL, Calodney AK, Hassenbusch S, Feller CA. Evidence-based practice guidelines for interventional techniques in the management of chronic spinal pain. *Pain Physician* 2003; 6:3-80.
 30. Manchikanti L, Singh V, Kloth DS, Slipman CW, Jasper JF, Trescot AM, Varley KG, Atluri SL, Giron C, Curran MJ, Rivera JJ, Baha A, Bakhit CE, Reuter M. Interventional techniques in the management of chronic pain: Part 2.o. *Pain Physician* 2001; 4:24-96.
 31. Guyatt G, Gutterman D, Baumann MH, Addrizzo-Harris D, Hylek EM, Phillips B, Raskob G, Lewis SZ, Schünemann H. Grading strength of recommendations and quality of evidence in clinical guidelines. Report from an American College of Chest Physicians task force. *Chest* 2006; 129:174-181.
 32. Oxman AD. Systematic reviews: Checklists for review articles. *BMJ* 1994; 309:648-651.
 33. Hayward R, Wilson M, Tunis S, Bass E, Guyatt G. Users' guides to the medical literature. VIII. How to use clinical practice guidelines. *JAMA* 1995; 274:570-574.
 34. Cates JR, Young DN, Guerriero DJ, Jahn WT, Armine JP, Korbett AB, Bowerman DS, Porter RC, Sandman TD, King RA. Evaluating the quality of clinical practice guidelines. *J Manipulative Physiol Ther* 2001; 24:170-176.
 35. Cluzeau FA, Burgers JS, Brouwers M, Grol R, Makela M, Littlejohns P, Grimshaw J, Hunt C, Asua J, Bataillard A, Browman G, Burnand B, Durieux P, Fervers B, Grilli R, Hanna S, Have P, Jovell A, Klazinga N, Kristensen F, Madsen PB, Miller J, Ollenschlaeger G, Qureshi S, Rico-Iturrioz R, Vader J-P, Zaat J. Development and validation of an international appraisal instrument for assessing the quality of clinical practice guidelines: The AGREE project. *Qual Saf Health Care* 2003; 12:18-23.
 36. Thomason M, Cluzeau F, Littlejohns P, Ollenschlaeger G, Grilli R, Rico-Iturrioz R, Grol R, Burgers J, Kristensen FB, Palmhoj-Nielsen C, Fervers B, Jovell A, Moran S, Grimshaw J, Burnand B, Klazinga N, Ten Have P, Durieux P, Miller J, Feder G, Makela M. Guideline development in Europe: An international comparison. *Int J Technol Assess Health Care* 2000; 16:1039-1049.
 37. AGREE Collaboration (Appraisal of Guidelines, Research, and Evaluation in Europe [AGREE] Collaborative Group). Appraisal of Guidelines for Research & Evaluation (AGREE) Instrument, September 2001.
 38. Hasenfeld R, Shekelle PG. Is the methodological quality of guidelines declining in the US? Comparison of the quality of US Agency for Health Care Policy and research (AHCPR) guidelines with those published subsequently. *Qual Saf Health Care* 2003; 12:428-434.
 39. Grol R, Cluzeau FA, Burgers JS. Clinical practice guidelines: Towards better quality guidelines and increased international collaboration. *Br J Cancer* 2003; 89:S4-S8.
 40. Nuckols TK, Winn BO, Lim Y-W, Shaw RN, Mattke S, Wickizer T, Harber P, Wallace P, Asch SM, MacLean C, Garland RH. Evaluating medical treatment guideline sets for injured workers in California. RAND Corporation. Institute for Civil Justice and RAND Health. www.rand.org/pubs/monographs/2005/RAND_MG400.pdf
 41. Cates JR, Young DN, Bowerman DS, Porter RC. An independent AGREE evaluation of the *Occupational Medicine Practice Guidelines*. *Spine J* 2006; 6:72-77.
 42. Helm S. California workers' compensation system: Are occupational medicine practice guidelines sufficient for the treatment of chronic spinal pain or do they require supplementation by guidelines for interventional techniques? *Pain Physician* 2004; 7:229-238.
 43. A guide to the development, implementation and evaluation of clinical practice guidelines. National Health and Medical Research Council, Canberra, Commonwealth of Australia, 1998, pp 1-79.
 44. Schünemann HJ, Fretheim A, Oxman AD, WHO Advisory Committee on Health Research. Improving the use of research evidence in guideline development: 1. Guidelines for guidelines. *Health Res Policy Syst* 2006; 4:13.
 45. Lohr KN. Rating the evidence of scientific evidence: Relevance for quality improvement programs. *Int J Qual Health Care* 2004; 16:9-18.
 46. Burgers JS, Cluzeau FA, Hanna SE, Hunt C, Grol R. Characteristics of high-quality guidelines: Evaluation of 86 clinical guidelines developed in ten European countries and Canada. *Int J Technol Assess Health Care* 2003; 19:148-157.
 47. Oxman AD, Schünemann HJ, Fretheim A. Improving the use of research evidence in guideline development: 16. Evaluation. *Health Res Policy Syst* 2006; 4:28.
 48. Manchikanti L, Singh V, Derby R, Schultz DM, Benyamin R, Prager VP, Hirsch JA. Reassessment of evidence synthesis of occupational medicine practice guidelines for interventional pain management. *Pain Physician* 2008; in press.
 49. Official comments on the ACOEM Guidelines process provided by ASIPP CEO, Laxmaiah Manchikanti, MD, November 26, 2007, Personal Communication.
 50. Shekelle P, Woolf S, Grimshaw J. Clinical guidelines: Developing guidelines. *BMJ* 1999; 318:593-596.
 51. Atkins D, Best D, Briss PA, Eccles M, Falck-Ytter Y, Flottorp S, Guyatt GH, Harbour RT, Haugh MC, Henry D, Hill S, Jaeschke R, Leng G, Liberati A, Magrini N, Mason J, Middleton P, Mrukowicz J, O'Connell D, Oxman AD, Phillips B, Schünemann HJ, Edejer TT, Varonen H, Vist GE, Williams JW Jr, Zaza S; GRADE Working Group. Grading quality of evidence and strength of recommendations. *BMJ* 2004; 328:1490.
 52. Berg AO, Allan JD. Introducing the third U.S. Preventive Services Task Force. *Am J Prev Med* 2001; 20(suppl 3):21-35.
 53. Oxman AD, Cook DJ, Guyatt GH. Users' guide to the medical literature. VI. How to use an overview. Evidence Based Medicine Working Group. *JAMA* 1994; 272:1367-1371.
 54. Oxman AD, Schünemann HJ, Fretheim A. Improving the use of research evidence in guideline development: 8. Synthesis

- and presentation of evidence. *Health Res Policy Syst* 2006; 4:20.
55. West S, King V, Carey TS, Lohr KN, McKay N, Sutton SF, Lux L. *Systems to Rate the Strength of Scientific Evidence*, Evidence Report, Technology Assessment No. 47. AHRQ Publication No. 02-E016. Rockville, MD: Agency for Healthcare Research and Quality, 2002. www.thecre.com/pdf/ahrq-system-strength.pdf
 56. Manchikanti L. Evidence-based interventional pain medicine: Is there any evidence? *Pain Physician* 2002; 5:1-7.
 57. Manchikanti L, Abdi S, Lucas LF. Evidence synthesis and development of guidelines in interventional pain management. *Pain Physician* 2005; 8:73-86.
 58. Manchikanti L, Heavner J, Racz GB, Mekhail NA, Schultz DM, Hansen HC, Singh V. Methods for evidence synthesis in interventional pain management. *Pain Physician* 2003; 6:89-111.
 59. Steinbrook R. Guidance for guidelines. *N Engl J Med* 2007; 356:331-333.
 60. Manchikanti L. Evidence-based medicine, systematic reviews, and guidelines in interventional pain management: Part I: Introduction and general considerations. *Pain Physician* 2008; 11:161-186.
 61. Haynes RB. What kind of evidence is it that Evidence-Based Medicine advocates want health care providers and consumers to pay attention to? *BMC Health Serv Res* 2002; 2:3.
 62. Sehon SR, Stanley DE. A philosophical analysis of the evidence-based medicine debate. *BMC Health Serv Res* 2003; 3:14.
 63. Guyatt GH, Haynes B, Jaeschke R, Cook D, Greenhalgh T, Meade M, Green L, Naylor CD, Wilson M, McAlister F, Richardson WS. Introduction: The Philosophy of Evidence-Based Medicine. In Guyatt G, Rennie D (eds). *Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice*. EBM Working Group. AMA Press, 2002, pp 3-12.
 64. Eisenberg JM. Evidence-based medicine. NIHCM Foundation, *Expert Voices*, January 2001. www.nihcm.org/nihcmor/pdf/ExpertV1.pdf
 65. Munev AM. Evidence-based medicine needs to be promoted more vigorously. *Managed Care Magazine*, February 2002. www.managedcaremag.com/archives/0202/0202.munev.html
 66. Goodman NW. Who will challenge evidence-based medicine? *J R Coll Physicians Lond* 1999; 33:249-251.
 67. Couto JS. Evidence-based medicine: A Kuhnian perspective of a transvestite non-theory. *J Eval Clin Pract* 1998; 4:267-275.
 68. Shaughnessy AF, Slawson DC, Becker L. Clinical jazz: Harmonizing clinical experience and evidence-based medicine. *J Fam Pract* 1998; 47:425-428.
 69. Hitt J. Evidence-based medicine. *New York Times Magazine*, December 9, 2001.
 70. Charlton BG, Miles A. The rise and fall of EBM. *QJM* 1998; 91:371-374.
 71. Tanenbaum SJ. What physicians know. *N Engl J Med* 1993; 329:1268-1271.
 72. Miles A, Charlton B, Bentley P, Polychronis A, Grey J, Price N. New perspectives in the evidence-based healthcare debate. *J Eval Clin Pract* 2000; 6:77-84.
 73. Miettinen OS. The modern scientific physician: 1. Can practice be science? *CMAJ* 2001; 165:441-442.
 74. Sackett DL, Straus S, Richardson SR, Rosenberg W, Haynes RB. *Evidence-Based Medicine: How to Practice and Teach EBM*. Churchill Livingstone, London, 2000.
 75. Haynes RB, Sackett DL, Gray JRM, Cook DL, Guyatt GH. Transferring evidence from research into practice: 1. The role of clinical care research evidence in clinical decisions. *ACP Journal Club* 1996; 125:A-14-16.
 76. Haynes RB, Devereaux PJ, Guyatt GH. Clinical expertise in the era of evidence-based medicine and patient choice. *ACP J Club* 2002; 136:A-11-14.
 77. Benson K, Hartz AJ. A comparison of observational studies and randomized, controlled trials. *Am J Ophthalmol* 2000; 130:688.
 78. Concato J, Shah N, Horwitz RI. Randomized, controlled trials, observational studies, and the hierarchy of research designs. *N Engl J Med* 2000; 342:1887-1892.
 79. Benson K, Hartz AJ. A comparison of observational studies and randomized, controlled trials. *N Engl J Med* 2000; 342:1878-1886.
 80. Kravitz RL, Duan N, Braslow J. Evidence-based medicine, heterogeneity of treatment effects, and the trouble with averages. *Milbank Q* 2004; 82:661-687.
 81. Tunis SR, Strider DB, Clancy CM. Practical clinical trials: Increasing the value of clinical research for decision making in clinical and health policy. *JAMA* 2003; 290:1624-1632.
 82. Roland M, Torgerson DJ. What are pragmatic trials? *BMJ* 1998; 316:285.
 83. Sackett DL, Rosenber WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: What it is and what it isn't. *BMJ* 1996; 312:71-72.
 84. Shortell SM, Rundall G, Hsu J. Improving patient care by linking evidence-based medicine and evidence-based management. *JAMA* 2007; 298:673-676.
 85. Walshe K, Rundall TG. Evidence-based management: From theory to practice in healthcare. *Milbank Q* 2001; 79:429-457.
 86. Berwick DM. Broadening the view of evidence-based medicine. *Qual Saf Health Care* 2005; 14:315-316.
 87. The Agency for Healthcare Research and Quality, U.S. Preventive Services Task Force Guide to Clinical Preventive Services, Vol. 1, AHRQ Pub. No. 02-500.
 88. Lewis CE. Variations in the incidence of surgery. *N Engl J Med* 1969; 281:880-884.
 89. Wennberg J, Gittelsohn A. Small-area variations in health care delivery. *Science* 1973; 182:1102-1108.
 90. Chassin MR, Brook RH, Park RE, Keesey J, Fink A, Koseoff J, Kahn K, Merrick N, Solomon DH. Variations in the use of medical and surgical services by the Medicare population. *N Engl J Med* 1986; 314:285-290.
 91. Cook C, Santos GC, Lima R, Pietrobon R, Jacobs DO, Richardson W. Geographic variation in lumbar fusion for degenerative disorders: 1990 to 2000. *Spine J* 2007; 7:552-557.
 92. Hudson N. Geographic variation in alcohol, drug abuse, and mental health services utilization: What is the role of physician practice patterns? *Find Brief* 2007; 10:1-2.
 93. McPherson K, Wennberg JE, Hovind OB, Clifford P. Small-area variations in the use of common surgical procedures: An international comparison of New England, England, and Norway. *N Engl J Med* 1982; 307:1310-1314.
 94. Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The implications of regional variations in Medicare spending. Part 1: The con-

- tent, quality, and accessibility of care. *Ann Intern Med* 2003; 138:273-287.
95. Holahan J. State variation in Medicaid spending: Hard to justify. *Health Aff (Millwood)* 2007; 26:w667-w669.
 96. Wennberg JE. Practice variations and health care reform: Connecting the dots. *Health Aff (Millwood)* 2004; Suppl Web Exclusives:VAR140-4.
 97. Chassin MR, Koscoff J, Park RE, Winslow CM, Kahn KL, Merrick NJ, Keeseey J, Fink A, Solomon DH, Brook RH. Does inappropriate use explain geographic variations in the use of health care services? A study of three procedures. *JAMA* 1987; 258:2533-2537.
 98. Schuster MA, McGlynn EA, Brook RH. How good is the quality of health care in the United States? *Milbank Q* 1998; 76:517-563.
 99. McNeil BJ. Shattuck lecture – hidden barriers to improvement in the quality of care. *N Engl J Med* 2001; 345:1612-1620.
 100. Pugh MJ, Rosen AK, Montez-Rath M, Amuan ME, Fincke BG, Burk M, Bierman A, Cunningham F, Mortensen EM, Berlowitz DR. Potentially inappropriate prescribing for the elderly: Effects of geriatric care at the patient and health care system level. *Med Care* 2008; 46:167-173.
 101. Fick DM, Mion LC, Beers MH, L Waller J. Health outcomes associated with potentially inappropriate medication use in older adults. *Res Nurs Health* 2008; 31:42-51.
 102. Queneau P, Doucet J, Paille F. When “deprescribing” drugs can improve the elderly patient’s health. *Bull Acad Natl Med* 2007; 191:271-282.
 103. Ryan S, Hassell A, Thwaites C, Manley K, Home D. Developing a new model of care for patients with chronic musculoskeletal pain. *J Nurs Manag* 2007; 15:825-829.
 104. Cadieux G, Tamblin R, Dauphinee D, Libman M. Predictors of inappropriate antibiotic prescribing among primary care physicians. *CMAJ* 2007; 177:877-883.
 105. Zhang Y, Borders TF, Rohrer JE. Correlates of intent to seek unnecessary pap tests among elderly women. *Womens Health Issues* 2007; 17:351-359.
 106. Eccles M, Mason J. How to develop cost-conscious guidelines. *Health Technol Assess* 2001; 5:1-69.
 107. Eddy DM, Billings J. The quality of medical evidence: Implications for quality of care. *Health Aff (Millwood)* 1988; 7:19-32.
 108. Manchikanti L. Health care reform in the United States: Radical surgery needed now more than ever. *Pain Physician* 2008; 11:13-42.
 109. Manchikanti L, Boswell MV. Interventional techniques in ambulatory surgical centers: A look at the new payment system. *Pain Physician* 2007; 10:627-650.
 110. Manchikanti L, Giordano J. Physician payment 2008 for interventionalists: Current state of health care policy. *Pain Physician* 2007; 10:607-626.
 111. Kohn LT, Corrigan JM, Donaldson MS, editors. To Err Is Human: Building a Safer Health System. A Report of the Committee on Quality of Health Care in America. Institute of Medicine. National Academy Press, Washington, DC, 2000.
 112. Eddy DM. *A Manual for Assessing Health Practices and Designing Practice Policies: The Explicit Approach*. American College of Physicians, Philadelphia, 1992.
 113. Keehan S, Sisko A, Truffer C, Smith S, Cowan C, Poisal J, Clemens MK, Accounts Projections Team NH. Health spending projections through 2017: The baby-boom generation is coming to Medicare. *Health Aff (Millwood)* Published online Feb. 26, 2008.
 114. Ginsburg PB. Don’t break out the champagne: Continued slowing of health care spending growth unlikely to last. *Health Aff (Millwood)* 2008; 27:30-32.
 115. Jadad AR, Cook DJ, Jones A, Klassen TP, Tugwell P, Moher M, Moher D. Methodology and reports of systematic reviews and meta-analyses: A comparison of Cochrane reviews with articles published in paper-based journals. *JAMA* 1998; 280:278-280.
 116. Riegelman RK. A guide to the guidelines: Method Section V, Chapter 34. In *Studying a Study & Testing a Test. How to Read the Medical Evidence, 5th Edition*. Lippincott Williams & Wilkins, Philadelphia, 2005, pp 292-296.
 117. Dennison PL. *Official Disability Guidelines, 13th ed*. Work Loss Data Institute, 2008.
 118. HAYES, Inc. Independent Health Technology Assessment Company. www.hayesinc.com
 119. Bigos SJ, Boyer OR, Braen GR, Brown K, Deyo R, Haldeman S, Hart JL, Johnson EW, Keller R, Kido D, Liang MH, Nelson RM, Nordin M, Owen BD, Pope MH, Schwartz RK, Stewart DH, Susman J, Triano JJ, Tripp LC, Turk DC, Watts C, Weinstein JN. Acute low back problems in adults. Clinical Practice Guideline No. 14, AHCPR Publication No. 95-0642. Rockville, Maryland. U.S.A., Agency for Health Care Policy and Research, Public Health Service, U.S., Department of Health and Human Services, December, 1994; pp 1-60.
 120. van Tulder MW, Tuut M, Pennick V, Bombardier C, Assendelft W. Quality of primary care guidelines for acute low back pain. *Spine* 2004; 29:E357-E362.
 121. Burgers JS, Fervers B, Haugh M, Brouwers M, Browman G, Philip T, Cluzea FA. International assessment of the quality of clinical practice guidelines in oncology using the Appraisal of Guidelines and Research and Evaluation Instrument. *J Clin Oncol* 2004; 22:2000-2007.
 122. AGREE Collaboration (Appraisal of Guidelines, Research, and Evaluation in Europe [AGREE] Collaborative Group). Appraisal of Guidelines for Research & Evaluation (AGREE) *Instrument Training Manual*. January 2003.
 123. Harris JS. Development, use, and evaluation of clinical practice guidelines. *J Occup Environ Med/Am College Occupa Environ Med* 1997; 39:23-34.
 124. Vergnenegre A. Clinical practice guidelines: A reader’s guide. *Revue Des Maladies Respiratoires* 2003; 20:920-927.
 125. California Workers’ Compensation Institute 2004. AB749: An Analysis of Medical Utilization Trends. www.cwci.org/icis/ViewReport.CFM?&ReportIndex519
 126. Klem MC, McKiever MF. 50-year chronology of occupational health. *J Occup Med* 1966; 8:225-234.
 127. Kiefer NC. The health of people who work. *J Occup Med* 1959; 1:545-548.
 128. Kehoe RA. Occupational medicine – whither and how! *J Occup Med* 1959; 1:1-6.
 129. Guidotti TL. Viewpoint: The invisible specialty: Occupational and environmental medicine. *AAMC Reporter*. April 2007. www.aamc.org/newsroom/reporter/april07/viewpoint.htm
 130. Sengupta I, Reno V. Recent trends in workers’ compensation. *Soc Secur Bull* 2007; 67:17-26.
 131. Rautiainen RH, Ohsfeldt R, Sprince NL,

- Donham KJ, Burmeister LF, Reynolds SJ, Saarimaki P, Zweling C. Cost of compensated injuries and occupational diseases in agriculture in Finland. *J Agromedicine* 2005; 10:21-29.
132. Lipold AG. The soaring costs of Workers' Comp. *Workforce*, February 2003, pp 42-48. www.workforce.com/section/02/feature/23/39/86/index.html
133. Workers compensation insurance costs increase, availability decreases. www.insure.com/articles/businessinsurance/workerscomp-costs.html
134. Green-McKenzie J. Workers' compensation costs: Still a challenge. *Clin Occup Environ Med* 2004; 4:395-398.
135. Harris JS, Glass LS, Mueller KL, Genovese E, ACOEM Practice Guidelines Committee. Evidence-based clinical occupational medicine: Updating the ACOEM occupational medicine practice guidelines. *Clin Occup Environ Med* 2004; 4:341-360.
136. American College of Occupational and Environmental Medicine (ACOEM). Methodology for the Update of the *Occupational Practice Guidelines, 2nd Edition*. November 13, 2006.
137. Boyd EA, Bero LA. Improving the use of research evidence in guideline development: 4. Managing conflicts of interest. *Health Res Policy Syst* 2006; 4:16.
138. Barnes DE, Bero LA. Scientific quality of original research articles on environmental tobacco smoke. *Tob Control* 1997; 6:19-26.
139. Bekelman JE, Li Y, Gross CP. Scope and impact of financial conflicts of interest in biomedical research: A systematic review. *JAMA* 2003; 289:454-465.
140. Cho MK, Bero LA. The quality of drug studies published in symposium proceedings. *Ann Intern Med* 1996; 124:485-489.
141. Lexchin J, Bero LA, Djulbegovic B, Clark O. Pharmaceutical industry sponsorship and research outcome and quality: Systematic review. *BMJ* 2003; 326:1167-1170.
142. Higgins P, Orris P. Providing employer-arranged occupational medical care: Conflicting interests. *Occup Med* 2002; 17:601-606.
143. Morton WE. In response to the 2002, vol. 22, no. 4 article entitled "The rise and fall of occupational medicine in the United States." *Am J Prev Med* 2002; 23:309.
144. Lax MB, Manetti FA, Klein RA. Medical evaluation of work-related illness: Evaluations by a treating occupational medicine specialist and by independent medical examiners compared. *Int J Occup Environ Health* 2004; 10:1-12.
145. Joint Position Statement: Updated ACOEM Chronic Pain and Low Back Guidelines from American Academy of Pain Medicine (AAPM), American Society of Interventional Pain Physicians (ASIPP), International Spine Intervention Society (ISIS), Neuromodulation Therapy Access Coalition (NTAC), and the North American Neuromodulation Society (NAMS). January 29, 2008.

