Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

Cervical and thoracic spine disorders.

Bibliographic Source(s)

Cervical and thoracic spine disorders. In: Occupational medicine practice guidelines: evaluation and management of common health problems and functional recovery in workers. Westminster (CO): Reed Group, Ltd.; 2016 May 27. p. 1-711. [1536 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Cervical and thoracic spine disorders. In: Hegmann KT, editor(s). Occupational medicine practice guidelines. Evaluation and management of common health problems and functional recovery in workers. 3rd ed. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2011. p. 1-332

This guideline meets NGC's 2013 (revised) inclusion criteria.

NEATS Assessment

National Guideline Clearinghouse (NGC) has assessed this guideline's adherence to standards of trustworthiness, derived from the Institute of Medicine's report Clinical Practice Guidelines We Can Trust.

 = Poor  = Fair  = Good  = Very Good  = Excellent

Assessment	Standard of Trustworthiness
YES	Disclosure of Guideline Funding Source
	Disclosure and Management of Financial Conflict of Interests

	Guideline Development Group Composition
YES	Multidisciplinary Group
YES	Methodologist Involvement
▮▮▯▯▯	Patient and Public Perspectives
	Use of a Systematic Review of Evidence
▮▮▮▮▯	Search Strategy
▮▮▮▮▯	Study Selection
▮▮▮▮▮	Synthesis of Evidence
	Evidence Foundations for and Rating Strength of Recommendations
▮▮▮▮▮	Grading the Quality or Strength of Evidence
▮▮▮▮▮	Benefits and Harms of Recommendations
▮▮▮▮▮	Evidence Summary Supporting Recommendations
▮▮▮▮▮	Rating the Strength of Recommendations
▮▮▮▮▮	Specific and Unambiguous Articulation of Recommendations
▮▮▮▮▮	External Review
▮▮▮▮▮	Updating

Regulatory Alert

FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

August 31, 2016 – Opioid pain and cough medicines combined with benzodiazepines: A U.S. Food and Drug Administration (FDA) review has found that the growing combined used of opioid medicines with benzodiazepines or other drugs that depress the central nervous system (CNS) has resulted in serious side effects, including slowed or difficult breathing and deaths. FDA is adding Boxed Warnings to the drug labeling of prescription opioid pain and prescription opioid cough medicines and benzodiazepines.

Recommendations

Major Recommendations

Note from the National Guideline Clearinghouse (NGC): Please refer to the original guideline document for detailed information on recommendations for specific interventions, including strength of evidence ratings and strength of recommendation categories.

Summary of Recommendations

The following is a general summary of the recommendations contained in this guideline:

The initial assessment of patients with cervical and thoracic spine problems focuses on detecting indications of potentially serious disease, termed "red flags" (i.e., fever, serious neurologic involvement, or major trauma).

In the absence of red flags, imaging and other tests are not recommended in the first 4 to 6 weeks of cervical and thoracic spine symptoms, as it almost never results in a meaningful change in clinical management. Nonprescription medication or an appropriately selected nonsteroidal anti-inflammatory drug (NSAID), appropriate adjustment of physical activity if needed, and the use of thermal modalities such as heat and/or cryotherapies can safely relieve discomfort. Some utilize manipulation in this phase.

In the absence of red flags, health care professionals can effectively manage most cervical and thoracic spine problems conservatively.

An early mechanical evaluation using repeated end-range test movements to determine the presence or absence of a directional preference and pain centralization has been suggested to guide directional exercise treatments that are associated with better outcomes, although the quality studies have only been done on the lower back.

At the first visit, the physician or other health care provider should assure the patient that cervical and thoracic pain is common, has an excellent prognosis, and in most cases is not debilitating on a long-term basis. Patients with elevated fear avoidance beliefs may require additional instructions and interventions to be reassured of this prognosis. Patients with elevated fear avoidant beliefs are likely candidates for utilization of tools to measure the beliefs. Patients with significantly elevated beliefs, particularly combined with early failure to progress as expected, are considered candidates for early referral to allied health professionals to prevent conversion to a chronic pain syndrome (see the American College of Occupational and Environmental Medicine [ACOEM] Chronic Pain guideline) (Cleland, Childs, & Fritz, 2008; Lee, Chiu, & Lam, 2006). Theoretically, this reassurance has the potential to decrease the probability of the patient developing a chronic pain syndrome.

To avoid undue weakness, atrophy, contractures, and debilitation from inactivity, some activity or job modification may be helpful in the acute period. However, bed rest is not recommended for essentially all cervical and thoracic pain and cervical radiculopathy patients other than those with unstable fractures or similar problems with pending neurological catastrophe. Maintaining ordinary activity, as tolerated, leads to the most rapid recovery.

All patients should be encouraged to return to usual activities and work as soon as possible as evidence suggests this leads to the best outcomes for all spine disorders. This process may be facilitated with temporary modified (or alternative) duty for acute and subacute pain, particularly if job demands exceed patient symptom tolerance. Full-duty work is a reasonable option for patients with acute and subacute pain syndromes with low physical job demands and the ability to control such demands (e.g., alternate their posture) as well as for those with less severe presentations. Full duty work is appropriate for those with chronic neck and thoracic pain syndromes who do not have objective evidence that work would cause a significant risk of substantial harm that is imminent (Americans with Disabilities Act), with the patient deciding whether the rewards of work despite symptoms is worth the "cost" of the symptoms.

Strengthening exercises have the best evidence of efficacy among the exercise regimens, whether for acute, subacute, or chronic cervical and thoracic pain patients. This contrasts with low back pain where aerobic exercise has the greatest evidence of efficacy.

Non-specific stretching is not recommended as it is not helpful for treatment of cervical and thoracic pain. However, directional exercise and slump stretching exercises may be helpful. Strengthening exercises, including cervical stabilization exercises, are recommended, but not until the acute period of cervical and thoracic pain has subsided.

There is evidence of efficacy for manipulation/mobilization in combination with exercise for treatment of non-specific neck pain for short-term pain relief and increased range of motion (ROM) compared to manipulation and/or mobilization alone or in combination.
There is some evidence for efficacy of acupuncture in chronic pain patients.
Many invasive and non-invasive therapies are intended to cure or manage pain, but no strong evidence exists that they accomplish this as successfully as therapies that focus on restoring functional ability without focusing on pain. In those cases, the traditional medical model of "curing" the patient does not work well. Furthermore, patients should be aware that returning to normal activities most often aids functional recovery.
Patients should be encouraged to accept responsibility for managing their recovery rather than expecting the provider to provide an easy "cure." This process will promote using activity rather than pain as a guide, and it will make the treatment goal of return to occupational and non-occupational activities more obvious.
If symptoms persist without improvement, further evaluation is recommended.
Within the first 3 months of cervical and thoracic spine symptoms, only patients with evidence of severe spinal disease or severe debilitating symptoms and physiologic evidence of specific nerve root or spinal cord compromise confirmed by appropriate imaging studies, can be expected to potentially benefit from surgery.
Quality evidence exists from trials of lumbar spine patients, and is believed to apply to patients with cervical and thoracic spine pain, indicating that patient outcomes are not adversely affected by delaying surgery for weeks or a few months and continued conservative care is encouraged in patients with stable or improving neurologic deficits who desire to avoid surgery. However, patients with either moderate to severe neurological deficits that are not improving or trending to improvement at 4 to 6 weeks may benefit from earlier surgical intervention. Those with progressive neurological deficit(s) are believed to have indications for immediate surgery. Those with severe deficits that do not rapidly improve are also candidates for earlier testing and referrals. Those with myelopathy also are candidates for early surgical intervention.
Nonphysical factors (such as psychiatric, psychosocial, environment including non-workplace and workplace issues, socioeconomic, litigation, or advocagenic problems) should be investigated and addressed in cases of delayed recovery or delayed return to work.
Physicians can greatly improve patient clinical responses by providing assurance, encouraging activity, and emphasizing that more than 90% of cervical and thoracic spine pain resolves without any specific therapies. While patients may be looking for a clear-cut diagnosis for their axial spine pain, the risk from a suggested "cure" for this assumed diagnosis can result in failed expectations, which may be a worse outcome than their symptoms.
Physicians should be aware that "abnormal" findings on x-rays, magnetic resonance images, and other diagnostic tests are so common by age 40, they are considered normal. There are higher rates of "abnormalities" in asymptomatic people in the cervical spine compared to the thoracic spine. Bulging disc prevalence continues to increase after age 40, and by age 60 will be encountered in 80% of patients' cervical spines. This requires that a careful history and physical examination be conducted by a skilled physician in order to correlate historical, clinical, and imaging findings prior to assigning the finding on imaging to a patient's complaints. It is recommended that physicians unable to make those correlations, and thus properly educate patients about these complex issues, should defer ordering imaging studies to a qualified consultant in musculoskeletal disorders (MSDs).
Without proper education on prevalence, treatment, and prognosis, patients may become fixated on "fixing" their "abnormality" found on imaging (which may in fact be a completely normal condition) and thus iatrogenically increase their risk of developing chronic pain.

Clinical Algorithm(s)

The following algorithms are available to subscribers:

Cervical and thoracic spine algorithm 1. Initial evaluation of acute and subacute cervical and thoracic spine pain

Cervical and thoracic spine algorithm 2. Initial and follow-up management of acute and subacute cervicothoracic and cervical radiculopathy pain
Cervical and thoracic spine algorithm 3. Evaluation of subactue or slow-to-recover patients with cervicothoracic pain unimproved or slow to improve (symptoms >4 weeks)
Cervical and thoracic spine algorithm 4. Surgical considerations for patients with anatomic and physiologic evidence of nerve root compression and persistent cervicothoracic symptoms
Cervical and thoracic spine algorithm 5. Further management of subacute cervicothoracic pain
Cervical and thoracic spine algorithm 6. Further management of chronic cervicothoracic pain
Master cervical and thoracic spine algorithm. ACOEM guidelines for care of acute and subacute cervical and thoracic spine pain

Scope

Disease/Condition(s)

Cervical and thoracic spine pain and other cervical and thoracic spine disorders (acute [<1 month duration], subacute [1 to 3 months duration], and chronic [>3 months duration])

Guideline Category

Diagnosis

Evaluation

Management

Rehabilitation

Treatment

Clinical Specialty

Chiropractic

Family Practice

Neurological Surgery

Neurology

Orthopedic Surgery

Physical Medicine and Rehabilitation

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Chiropractors

Health Care Providers

Health Plans

Nurses

Occupational Therapists

Other

Patients

Physical Therapists

Physician Assistants

Physicians

Utilization Management

Guideline Objective(s)

To define evidence-based best practices for key areas of occupational medical care and disability management in order to:

- Improve the efficiency and accuracy with which the diagnostic process is conducted
- Identify the effectiveness and risks of individual treatments and treatment plans in resolving a disease process, structural pathology, or relieving symptoms and achieving functional improvement and return to work
- Improve or restore the health of workers with occupationally related illnesses or injuries by using proven effective tests and treatments with net benefit
- Improve the quality of occupational medical care and disability management
- Enhance patient autonomy

Target Population

Working-age adults with cervical and thoracic spine disorders related to work or that affect the ability to work

Note: In general, the age range under consideration had been 18 to 65. However, many workers are now older than 65, so some guidance has been expanded to include all workers. Thus while the American College of Occupational and Environmental Medicine (ACOEM) guidelines are targeted towards working-age adults, the evidence used may include the general adult population, resulting in guidelines that likely have substantially wider applicability than the target population.

Interventions and Practices Considered

Diagnosis/Evaluation*

- Initial assessment (presence or absence of red flags)
- Medical history
- Physical examination
- Diagnostic tests (x-rays, magnetic resonance imaging [MRI], electromyography, discography, functional capacity evaluations, myeloscopy, ultrasound, thermography, fluoroscopy)

Management/Treatment*

- Initial care
- Activity modification and exercise
- Medications (nonsteroidal anti-inflammatory drugs [NSAIDs], acetaminophen, antidepressants, anti-epileptic agents, capsaicin, "sports creams," other creams and ointments, lidocaine patches, colchicine, glucocorticosteroids, skeletal muscle relaxants, opioids)
- Physical therapy, occupational therapy, or chiropractic therapy

Devices
Iontophoresis
Physical methods (e.g., acupuncture, cryotherapies, heat therapies, massage, reflexology, traction, laser therapy, manual therapy [manipulation and mobilization], transcutaneous electrical stimulation [TENS] etc.)
Injection therapies (botulinum, cervical epidural glucocorticosteroid injections, and other types of injection therapies)
Surgical interventions
Rehabilitation for delayed recovery

*See the "Major Recommendations" field in this summary and the original guideline document for indications for use and specific recommendations as not all the listed interventions and practices are recommended.

Major Outcomes Considered

- Sensitivity, specificity, positive and negative predictive value of diagnostic tests
- Pain intensity
- Symptom alleviation and cure
- Time to return to work

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Searches of Unpublished Data

Description of Methods Used to Collect/Select the Evidence

Literature Evaluation: Literature Search and Study Selection

The Research Team conduct systematic literature reviews for each guideline topic assigned. In order to identify all high- and moderate-quality original research studies, the literature search is broad and comprehensive. Medical Subject Heading (MeSH) terms are used to identify studies relevant to the tests, treatments and diagnoses in question. A combination of MeSH terms and other terms are used in order to determine the method that will yield the most relevant studies in the search process.

Treatment-Related Study Searches

For treatment-related study searches, randomized controlled trials (RCTs), and randomized crossover trials, quality guidelines, meta-analyses and systematic reviews are the primary foci of these exhaustive literature searches. Prospective and retrospective cohort studies are searched if there are no RCTs and systematic reviews identified. High-quality guidelines, meta-analyses and systematic reviews are sought primarily for verification of search completeness; they are independently assessed for reproducibility of conclusions.

RCTs and randomized crossover trials are all selected for critical appraisal and quality grading (see Attachment 7 in the methodology document [see the "Availability of Companion Documents" field]). For evidence of harms, case reports, case series, retrospective cohort studies, and arms of RCTs are sought. For risk factor assessments, prospective and retrospective cohort studies are preferentially sought, with

case control or cross sectional studies selected where cohort studies are absent. In some cases, studies with lower grades of evidence may be selected to examine current practice patterns or for other reasons. In order to ensure that all relevant, higher-quality studies are identified, researchers also perform hand searches of reference lists in related articles.

Diagnostic or Screening Searches

For diagnostic study searches, all study design types are searched. Searches for these topics primarily focus on large, comparative trials looking at two or more diagnostic tests that are being compared. Ideally, one is the "gold standard" test for that condition. Key terms (such as "Sensitivity and Specificity" [MeSH] OR "Predictive Value of Tests" [MeSH] OR "Gold-standard" OR accurate OR accuracy OR precision OR precise OR test) are used to identify the accuracy of the new test. Delimiters are used to narrow the search results and include: "Humans" and "English."

Diagnostic studies are then summarized in evidence tables (see Attachment 8 in the methodology document). Quality grading of these studies is done by following a grading scheme which is different from the scheme used for RCTs (see Table C in the methodology document). Emphasis is placed on what the test being studied is compared to. Another criterion is data to calculate test specificity and sensitivity can be calculated. Studies that compare the new test to an established gold standard test are evaluated first. Studies that compare the new test to another test, but not the gold standard are also evaluated. In order to ensure all relevant studies are included in the review, researchers consult with panel members and screen the references from the previously identified studies.

Search Term Documentation

Search strategies and methods, including specific databases, search terms, number of studies found (e.g., regarding treatment efficacy searches including RCTs and crossover trials) are documented. A search results section (in paragraph form) is included as a footnote for each evidence table (see the original guideline document). This section includes the databases searched, limits on publication dates and languages, the search terms used, the number of studies found from all the databases searched, the total number of articles screened, the number meeting inclusion and exclusion criteria, the number critically appraised, and the total number of studies included. See Attachment 9 in the methodology document for an example of a bibliographic search criteria table. The tracking logs that document the search process, search terms, limitations, etc., are also published in order to maintain transparency.

There are instances when the number of studies found from all the databases does not match the number of studies screened for inclusion criteria. The researcher may encounter searches for which the search terms have yielded an unwieldy volume of results, especially amplified by Google Scholar (e.g., >20,000 abstracts/titles in all databases combined). In these instances, the researcher will re-consult with the ACOEM Guidelines Editor-in-Chief regarding the scope of a more focused search. An example of a more focused search is to conduct a thorough search of the first 10 pages of search results (which by default equals 200 abstracts in most databases). The Research Team has found that the relevance of abstracts significantly decreases after 10 pages of abstracts/titles. In no case do they search less than 10 pages of Google Scholar results.

The Research Team reviews the abstracts of all citations found in the bibliographic search and identifies studies relevant to the topic that might meet the inclusion criteria (e.g., in English, RCTs that address treatment questions, relevant literature for adverse effects, and comparative studies for diagnostic or screening tests) as adequate evidence and that could be used as the basis for evidence-based guidance statements. Researchers then retrieve the full text of these articles and perform a second screening process of the study in order to determine which studies meet the inclusion criteria to be considered as adequate evidence for these purposes (as shown in Table A-1 and Table A-2 in the methodology document). For those studies accepted as providing adequate evidence, individual article quality ratings are included in the evidence tables.

Databases to Be Searched

The American College of Occupational and Environmental Medicine (ACOEM) searches the following

databases for primary sources of original research. It may also search other databases likely to contain references to high quality medical literature. Additional literature may be reviewed brought to the committee's attention from interested parties.

The National Library of Medicine's National Institute of Health (PubMed)
CINAHL (nursing, biomedicine, health sciences librarianship, alternative/complementary medicine, consumer health and 17 allied health disciplines)
The Cochrane Central Register of Controlled Trials
Scopus
Google Scholar

Search terms are listed with each table of evidence (see the original guideline document).

Gray literature is included primarily through searches of Google Scholar. Google Scholar searches are naturally hierarchical searches; thus, although the number of articles retrieved is often massive, the relevance is likely to be less the further one goes into the citations found. The Research Team reviews a minimum of the first 10 pages of results, or approximately 200 abstracts/titles in all cases. They may review additional abstracts to obtain relevant citations if, once they review the 10 pages, they continue to identify potentially relevant citations. They do not have a maximum limit on the number of pages of citations to review.

Ongoing literature surveillance is also used to assure currency of guidelines recommendations, as well as to provide literature to be incorporated during the next comprehensive update. This includes assessment of articles in prominent, high-impact journals at least weekly.

Number of Source Documents

A search results section (in paragraph form) is included as a footnote for each evidence table (see the original guideline document). This section includes the databases searched, limits on publication dates and languages, the search terms used, the number of studies found from all the databases searched, the total number of articles screened, the number meeting inclusion and exclusion criteria, the number critically appraised, and the total number of studies included.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

A	Strong evidence-base: Two or more high-quality studies
B	Moderate evidence-base: At least one high-quality study or multiple moderate-quality studies 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

Note: For treatment, the criteria used by evidence reviewers to categorize the quality of individual randomized controlled trials as high, moderate, or low quality are: adequate randomization, concealed treatment allocation, baseline cohort comparability, patient blinded, provider blinded, assessor blinded, controlled for co-interventions, compliance acceptable, dropout rate acceptable, timing of assessments equivalent, data analyzed by intention to treat, and lack of bias. Each criterion receives a score of 0, 0.5, or 1. See Table B in the methodology document (see the "Availability of Companion Documents" field) for a definition of each criterion and rating explanation for treatment studies and Table C for diagnostic studies. Studies are considered of low quality if they are rated 3.5 or less, moderate quality if they are rated 4-7.5, and high quality if they are rated 8-11.

For diagnostic studies, the appraisals and critiques are different from those used for treatment studies. The highest scores are given to studies that compare the new test to a gold standard (if one exists). The timing of the testing in relation to the progression of the disease state is also evaluated. The score for diagnostic studies is also a proportion of a possible total of 11. The categorization of high-,

moderate-, and low-quality studies is the same as in treatment-related studies.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Literature Evaluation: Critical Review of Studies

The Research Team reviews in detail each study that meets inclusion criteria. They summarize important information from each article in an evidence table (see Attachment 11 in the methodology document for sample evidence table). Evidence tables include first author's last name, year of publication, study design, quality rating score, population sample, treatment comparison, results, conclusions and any comments relevant to the study. In addition, potential conflict of interest (COI) and study sponsorship are reported.

The evidence presented in the evidence tables is limited to primary studies. In most cases, quality systematic reviews, meta-analyses and professional guidelines are reviewed for comparison and assessment of reproducibility. The relative ranking of study designs for theoretical robustness of design is shown in Attachment 7 in the methodology document. The below table summarizes the level of confidence levels for the different study designs. While study design should confer various levels of confidence in the reproducibility of the results, how the studies are conducted and analyzed is quite variable and must be specifically appraised.

Study Design	Level of Confidence
Randomized controlled trials (score of 0-11, with 8-11 high quality, 4-7.5 moderate quality)	I
Prospective cohort study	II
Prospective comparative study	II
Case-crossover study	II
Large, population-based study	II
Retrospective study	III
Case-control study	III
Cross-sectional study	III

Therefore, the Research Team critically appraises grades and critiques each study. Reviewers grade each study using the numerical quality score shown in Table B, "Quality Scoring of Treatment Studies," and Table C, "Scoring for Diagnostic Studies" (see the methodology document). These scores are grouped into designations of high, moderate or low quality evidence and report the scoring in the combined quality assessment table (see Attachment 11 in the methodology document for sample evidence table) (e.g., quality scores of 4.0 or higher are moderate or high quality).

For diagnostic studies, the appraisals and critiques are different from those used for treatment studies. The highest scores are given to studies that compare the new test to a gold standard (if one exists). The timing of the testing in relation to the progression of the disease state is also evaluated. The score for diagnostic studies is also a proportion of a possible total of eleven. The categorization of high, moderate, and low quality studies is the same as in treatment-related studies.

After research assistants complete the evidence tables, researchers with graduate-level education (i.e.,

Master's, PhDs, MDs) score each study for quality. The study is critiqued for methodological strengths and weaknesses, and assessed for the robustness and validity of the conclusions derived from the presented data. After the body of quality evidence is assembled, scored and critiqued on a given subject, the body of evidence is graded (see the "Rating Scheme for the Strength of the Evidence" field). Draft recommendations are then formulated to be sent to the Evidence-based Practice Committee (EBPP). In all cases, a Research Team physician performs a secondary review for clinical relevance and logic. The Panels may also perform an additional quality review.

Methods Used to Formulate the Recommendations

Expert Consensus

Expert Consensus (Nominal Group Technique)

Description of Methods Used to Formulate the Recommendations

Development of Guidelines and Recommendation Statements

The process for development of American College of Occupational and Environmental Medicine (ACOEM) guidelines and evidence-based products was developed by the Guideline Methodology Committee (GMC) and includes participation of the Evidence-based Practice Panels (EBPC or "Panels"), review and formulation of recommendations by the Panels, stakeholder input, external peer review, and review by the ACOEM Board of Directors. Members of the Guideline development groups are selected from applications of ACOEM members and nominees from relevant interest groups and professional organizations.

The Panels review and modify draft recommendations formulated by the Research Team. The Panels (and/or sub-Panels) review the evidence tables, evidence summaries, draft recommendations, and the original studies if needed. After review, the Panels conduct discussions and agree on the strength of evidence ratings for each topic (see the "Rating Scheme for the Strength of the Evidence" field) and finalize recommendations for all clinical questions. If sub-Panels are employed, the recommendations of the sub-Panel are forwarded to the entire Panel in aggregate for additional discussion. Each recommendation is clearly labeled as "strongly recommended," "moderately recommended," "recommended," "consensus-recommended," "consensus-no recommendation," "consensus -not recommended," "not recommended," "moderately not recommended," and "strongly not recommended" (see the "Rating Scheme for the Strength of the Recommendations" field). Panel unanimity is sought. Failing attainment of unanimity, consensus is sought for all recommendations and rationales in each guideline. There may be multiple communications (e.g., teleconferences, e-mail, in-person meetings) utilized to reach a unanimous opinion (or consensus) on both the recommendation and the wording of the recommendation for any individual topic.

When consensus is not possible, a vote is taken (see Attachment 12 in the methodology document for a voting process example). Voting on guideline recommendations will be conducted using a modification of the nominal group technique (NGT). Each member of the guideline Work Group ranks his or her agreement with a guideline recommendation or performance measure on a scale ranging from 1 to 9 (where 1 is "extremely inappropriate" and 9 is "extremely appropriate"). Consensus is obtained if the number of individuals who do not rate a measure as 7, 8, or 9 is statistically non-significant (as determined using the binomial distribution). Minority statements may be included in such cases.

The health benefits, adverse effects, risks and relative costs of each recommended test or treatment are explicitly considered and discussed in formulating the recommendations. Benefits should significantly exceed risks. Each recommendation is to specify to which condition it applies. For tests and treatment recommendations, the recommendations will state the:

Diagnoses or problems for which the test or treatment is indicated
Specific indications for the test or treatment including prior treatments or tests that might be

appropriate, and how many would be appropriate prior to application of the additional treatment or tests
Point in the time course of the problem for which the test or treatment is appropriate
Conservative treatment that should be carried out prior to use of the test and treatment
Reasonable or necessary concurrent treatments
Relative and absolute contraindications to the test or procedure
Number of tests or procedures that are appropriate at a given time in the course of the problem
Potential benefits of the test or procedure
Potential harms, including effects on disability and return to work
Relative costs [low (<$100), medium ($100-500), or high (>$500)]
Level of confidence (certainty regarding) in the evidence supporting the recommendations [low, moderate, or high]. A high strength of evidence (A) coincides with high confidence, moderate evidence (B) with moderate confidence, and low evidence (C and I) with low confidence. The Panel adjusts these up or down based on additional information (e.g., urine drug screening for opioids compliance does not undergo randomized controlled trials [RCTs] so this recommendation could be upgraded to high confidence).

Studies that include the general population of adults are necessarily used to develop most recommendations in the guidelines. However, thoughtful consideration is given to the extent to which the findings may, or may not be applicable to employed populations.

ACOEM's "First principles" of clinical logic and ethics should be observed in formulating guidelines and clinical recommendations. These principles are defined in the methodology companion (see the "Availability of Companion Documents" field).

Rationale Statements

There should be an explicit link between each recommendation and the supporting evidence. Each recommendation includes an evidence table and list of references. Each recommendation is accompanied by a paragraph that describes the Panel's conclusion about the evidence found on that question, known as the rationale for the specific recommendation. These paragraphs explain how the Panel interpreted and weighed the evidence and how they balanced evidence of effectiveness or accuracy against potential harms and relative cost-effectiveness in formulating the recommendations. For example, if the quality of the synthesized evidence was inconsistent, then the Panel may comment on how they interpreted and weighed the evidence in a logical and fair way and adhered to the "first principles." The final recommendations are then drafted and approved (see Table F for characteristics of the recommendations). Attachment 13 in the methodology document summarizes the process described above (the literature search, review of studies, and development of recommendations) and which individuals are responsible for each task.

Rating Scheme for the Strength of the Recommendations

Strength of Recommendations

Recommendation Category	Evidence Rating	Description of Category
Strongly Recommended	A	The intervention is strongly recommended for appropriate patients. The intervention improves important health and functional outcomes based on high quality evidence, and the Evidence-Based Practice Panel (EBPP) concludes that benefits substantially outweigh harms and costs.
Moderately Recommended	B	The intervention is recommended for appropriate patients. The intervention improves important health and functional outcomes based on moderate quality evidence that benefits substantially outweigh harms and costs.
Recommended	C	The intervention is recommended for appropriate patients. There is

Recommendation Category	Evidence Rating	Description of Category
		limited evidence that the intervention may improve important health and functional benefits.
Consensus* Recommended	I	The intervention is recommended for appropriate patients and has nominal costs and essentially no potential for harm. The EBPP feels that the intervention constitutes best medical practice to acquire or provide information in order to best diagnose and treat a health condition and restore function in an expeditious manner. The EBPP believes based on the body of evidence, first principles, or collective experience that patients are best served by these practices, although the evidence is insufficient for an evidence-based recommendation.
Consensus* No Recommendation	I	The evidence is insufficient to recommend for or against routinely providing the intervention. The EBPP makes no recommendation. Evidence that the intervention is effective is lacking, of poor quality, or conflicting and the balance of benefits, harms, and costs cannot be determined.
Consensus* NOT Recommended	I	The evidence is insufficient for an evidence-based recommendation. The intervention is not recommended for appropriate patients because of high costs or high potential for harm to the patient.
NOT Recommended	C	Recommendation against routinely providing the intervention. The EBPP found at least moderate evidence that harms and costs exceed benefits based on limited evidence.
Moderately NOT Recommended	B	Recommendation against routinely providing the intervention to eligible patients. The EBPP found at least moderate evidence that harms and costs outweigh benefits.
Strongly NOT Recommended	A	Strong recommendation against providing the intervention to eligible patients. The EBPP found high quality evidence that the intervention is ineffective, or that harms or costs outweigh benefits.

*In the absence of evidence, these recommendations are based on expert opinion.

Cost Analysis

- The health benefits, adverse effects, risks and relative costs of each recommended test or treatment are explicitly considered and discussed in formulating the recommendations. The more costly the test or intervention, the more caution should be generally exercised prior to ordering the test or treatment and the stronger the evidence of efficacy should be. When two treatment methods appear equivalent, the most cost-effective method is preferred.
- The rationale statements explain how the Panel interpreted and weighed the evidence and how they balanced evidence of effectiveness or accuracy against potential harms and relative cost-effectiveness. Refer to the rationale sections following each recommendation and the accompanying evidence tables for information on cost effectiveness for recommendations for which such evidence is available.

Method of Guideline Validation

Clinical Validation-Pilot Testing

Comparison with Guidelines from Other Groups

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

External Peer Review

The American College of Occupational and Environmental Medicine (ACOEM) conducts external peer review

of the *Guidelines* to 1) assure that all relevant high-quality scientific literature related to the topics has been found, 2) assure that the important evidence from the scientific literature relevant to the *Guidelines* has been accurately interpreted, 3) solicit opinions on whether the findings and recommendation statements are appropriate and consistent with the evidence, and 4) obtain general information on the *Guidelines*' conclusions and presentation from external topic experts. A more detailed explanation of the external peer review process is included in Attachments 14 and 15 in the methodology document (see the "Availability of Companion Documents" field). These experts may also review the methodology used as well as summaries of the critically appraised evidence and the recommendations in each area. The *Guidelines* list the names of all peer reviewers, along with their affiliations for those not desiring anonymity. The Panels review the comments received from the external peer reviewers and make any final modifications to the *Guidelines*. In addition, a pre-publication version of all guidelines will be posted at the *MDGuidelines* site for a period of two weeks for public comment.

Stakeholder Input

In order to understand the needs and preferences of those individuals and organizations who use or are affected by the use of clinical practice guidelines in workplace settings and in the workers' compensation system, ACOEM solicits input from the following stakeholders: clinicians, health-care systems, labor representatives, workers/patients, employers, utilization reviewers, case managers, insurers and third party administrators, attorneys, regulators and policy makers. ACOEM solicits input from these stakeholders by inviting them to submit comments through ACOEM Web site (see Attachment 16 in the methodology document for further details).

ACOEM also seeks input from stakeholders into the scoping of the guidelines by inviting them to submit comments through ACOEM Web site on the list of clinical questions researched for each guideline.

Comparison with Guidelines from Other Groups

The evidence presented in the evidence tables is limited to primary studies. In most cases, quality systematic reviews, meta-analyses, and professional guidelines are reviewed for comparison and assessment of reproducibility.

Pilot Testing

The *Guidelines* are pilot tested by having clinicians, utilization review managers, case managers, state workers' compensation systems, etc., use or comment on use of the *Guidelines* in their daily practice or management activities to determine if they are clear, easy to use and generally useful. The *Guidelines* may be modified based on the feedback received from pilot testing, if the suggestions increase usability. In 2014, the Reed Group conducted a pilot test and redesigned their website to address the input received during this process. For example, tools (e.g., DART [Diagnosis and Related Treatments]) have been developed to help users get to the recommendations, evidence, and rationale more easily.

Review by the Guideline Methodology Committee (GMC) and the ACOEM Board of Directors

During the entire evidence-based development process, a designated methodologist from the GMC works with the Panels, editors and Research Team to ensure that this evidence-based methodology is being followed, both in the literature evaluation process and in the development of conclusion, rationale, and recommendation statements. The ACOEM Board of Directors may comment on the guidelines during the external review period. Their comments are reviewed by the Panel and any acceptable changes are made to the guideline reviewed. The Panels and the Research Team have complete editorial independence from ACOEM and Reed Group, neither of which influences the *Guidelines*.

Evidence Supporting the Recommendations

References Supporting the Recommendations

Cleland JA, Fritz JM, Childs JD. Psychometric properties of the Fear-Avoidance Beliefs Questionnaire and Tampa Scale of Kinesiophobia in patients with neck pain. Am J Phys Med Rehabil. 2008 Feb;87(2):109-17. PubMed

Lee KC, Chiu TT, Lam TH. Psychometric properties of the Fear-Avoidance Beliefs Questionnaire in patients with neck pain. Clin Rehabil. 2006 Oct;20(10):909-20. PubMed

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the original guideline document).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Improved efficiency and accuracy of the diagnostic process
- Effective treatment resulting in resolving a disease process, structural pathology, or relieving symptoms and achieving functional improvement and return to work
- Improved or restored health of workers with occupationally related illnesses
- Improved quality of occupational medical care and disability management
- Enhanced patient autonomy

The health benefits of each recommended test or treatment are explicitly considered and discussed in formulating the recommendations. Refer to the "benefits" statements and rationale sections following each recommendation and the accompanying evidence tables for information on benefits versus harms for recommendations for which such evidence is available.

Potential Harms

- False-positive diagnostic tests
- Risks and complications of surgical procedures and imaging studies (e.g., infection, radiation exposure, medicalization)
- Adverse effects of medications
- Manipulation is generally considered a safe procedure, but like all other treatments is not without risks. For example, reported fatal outcomes have occurred and are particularly attributed to cervical manipulation. Reports of more severe but rare adverse effects include vertebrobasilar dissection, carotid artery injury, and disc herniation or spinal cord compression myelopathy, although these reports need to be considered in the context of natural progressions of cervical pain without any intervention.

The adverse effects of each recommended test or treatment are explicitly considered and discussed in formulating the recommendations. Refer to the "harms" statements and rationale sections following each recommendation and the accompanying evidence tables for information on benefits versus harms for recommendations for which such evidence is available.

Contraindications

Contraindications

There are no specific contraindications to manipulation under anesthesia (MUA) beyond those of its individual components (e.g., anesthesia and spinal manipulative therapy [SMT]). These contraindications include spinal malignancy, hypermobility, instability, acute inflammation, infection, fracture, progressive neurological deficits, large aortic aneurysms, bleeding disorders, severe osteoporosis, acute gout, spinal cord compression, several canal stenosis, sequestered nucleus pulposus, or cardiopulmonary conditions precluding anesthesia. It has also been suggested that procedures such as MUA are not appropriate for patients who could improve with a simpler, more cost-effective therapy that does not involve anesthesia.

Qualifying Statements

Qualifying Statements

- Compared with low back pain, there are relatively few quality trials evaluating cervical pain and still fewer that evaluate work-related cervical pain. Therefore, studies that include non-workers' compensation patients were used to develop these recommendations. Industry-sponsored trials were also included. Most studies did not delineate specific diagnoses for cervical pain as a precise anatomic source for most cervical pain episodes is unknown. The lack of specific pathophysiological correlates has resulted in treatment classifications schemes that have been at least partially validated.
- As funding/sponsorship of pharmaceuticals and devices or appliances is almost universally commercial, evidence tables will include information about potential conflicts of interest beginning in 2014. It is also problematic that there are studies of expensive interventions conducted in clinical settings where there is significant bias to support the organization's business; currently, there is no clear method to address this potentially significant source of funding bias. In certain areas, this may have made little difference as the comparisons were between the medication and placebo and the results may be consistent and considerable. However, in other studies, the comparison groups may have been sub-optimally treated (e.g., a low-dose of ibuprofen) and produced a bias in favor of the medication or device. In addition, industry-sponsored studies have been shown to frequently have better results and lower complication rates than studies conducted by independent investigators.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Clinical Algorithm

Quick Reference Guides/Physician Guides

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Cervical and thoracic spine disorders. In: Occupational medicine practice guidelines: evaluation and management of common health problems and functional recovery in workers. Westminster (CO): Reed Group, Ltd.; 2016 May 27. p. 1-711. [1536 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2016 May 27

Guideline Developer(s)

American College of Occupational and Environmental Medicine - Medical Specialty Society

Source(s) of Funding

American College of Occupational and Environmental Medicine (ACOEM) guidelines are funded by Reed Group.

Guideline Committee

Evidence-based Practice Cervical and Thoracic Spine Panel

Composition of Group That Authored the Guideline

Editor-in-Chief: Kurt T. Hegmann, MD, MPH, FACOEM, FACP

Evidence-based Practice Spine Panel Chair: Russell Travis, MD

Evidence-based Practice Spine Panel Members: Gunnar B. J. Andersson, MD, PhD; Roger M. Belcourt, MD,

MPH, FACOEM; Ronald Donelson, MD, MS; Marjorie Eskay-Auerbach, MD, JD; Jill Galper, PT, MEd; Michael Goertz, MD, MPH, FACOEM; Scott Haldeman, MD, DC, PhD, FRCP(C), FAAN, FCCS; Paul D. Hooper, DC, MPH, MS; James E. Lessenger, MD, FACOEM; Tom Mayer, MD; Kathryn L. Mueller, MD, MPH, FACOEM; Donald R. Murphy, DC; William G. Tellin, DC, DABCO; Michael S. Weiss, MD, MPH, FACOEM, FAAPMR, FAANEM

Financial Disclosures/Conflicts of Interest

As required for quality guidelines (Institute of Medicine's [IOM's] Standards for Developing Trustworthy Clinical Practice Guidelines and Appraisal of Guidelines for Research and Evaluation [AGREE]) a detailed application process captured conflicts of interest of Evidence-based Practice Spine Panel members. The Panel has none to declare relevant to this guideline.

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Cervical and thoracic spine disorders. In: Hegmann KT, editor(s). Occupational medicine practice guidelines. Evaluation and management of common health problems and functional recovery in workers. 3rd ed. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2011. p. 1-332

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available to subscribers from the American College of Occupational and Environmental Medicine (ACOEM) Web site and the Reed Group's MDGuidelines Web site.

Availability of Companion Documents

The following is available:

> Methodology for ACOEM's occupational medicine practice guidelines, 2016 revision. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2016. 73 p. Available from the ACOEM Web site.

In addition, a Web-based recommendation tool called DART (Diagnosis and Related Treatments) is available to subscribers at the Reed Group's MDGuidelines Web site.

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on July 20, 2012. The information was verified by the guideline developer on August 6, 2012. This summary was updated by ECRI Institute on October 28, 2013 following the U.S. Food and Drug Administration advisory on Acetaminophen. This summary was updated by ECRI Institute on July 3, 2014 following the U.S. Food and Drug Administration advisory on Epidural Corticosteroid Injection. This summary was updated by ECRI Institute on September 18, 2015 following the U.S. Food and Drug Administration advisory on non-aspirin nonsteroidal anti-inflammatory drugs

(NSAIDs). This summary was updated by ECRI Institute on June 2, 2016 following the U.S. Food and Drug Administration advisory on opioid pain medicines. This summary was updated by ECRI Institute on October 21, 2016 following the U.S. Food and Drug Administration advisory on opioid pain and cough medicines combined with benzodiazepines. This summary was updated by ECRI Institute on April 17, 2017. The updated information was verified by the guideline developer on May 25, 2017.

This NEATS assessment was completed by ECRI Institute on June 22, 2017. The information was verified by the guideline developer on June 28, 2017.

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