Complete Summary

GUIDELINE TITLE

Low back pain.

BIBLIOGRAPHIC SOURCE(S)

Bradley WG Jr, Seidenwurm DJ, Brunberg JA, Davis PC, DE La Paz RL, Dormont D, Hackney DB, Jordan JE, Karis JP, Mukherji SK, Turski PA, Wippold FJ, Zimmerman RD, McDermott MW, Sloan MA, Expert Panel on Neurologic Imaging. Low back pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 7 p. [23 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Anderson RE, Drayer BP, Braffman B, Davis PC, Deck MD, Hasso AN, Johnson BA, Masaryk T, Pomeranz SJ, Seidenwurm D, Tanenbaum L, Masdeu JC. Acute low back pain--radiculopathy. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):479-85.

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

** 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.

- May 23, 2007, Gadolinium-based Contrast Agents: The addition of a boxed warning and new warnings about the risk of nephrogenic systemic fibrosis (NSF) to the full prescribing information for all gadolinium-based contrast agents (GBCAs).

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SCOPE

DISEASE/CONDITION(S)

Acute low back pain with or without radiculopathy

GUIDELINE CATEGORY

Diagnosis

CLINICAL SPECIALTY

Family Practice
Internal Medicine
Neurology
Nuclear Medicine
Orthopedic Surgery
Radiology

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for patients with acute low back pain with or without radiculopathy

TARGET POPULATION

Patients with acute low back pain with or without radiculopathy

INTERVENTIONS AND PRACTICES CONSIDERED

1. X-ray, lumbar spine
2. Nuclear medicine (NUC), bone scan

3. Computed tomography (CT), lumbar spine, without contrast
4. Myelogram
5. Myelogram/CT
6. Magnetic resonance imaging (MRI)
    - Lumbar spine, without contrast
    - Lumbar spine, with and without contrast

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of peer-reviewed medical journals, and the major applicable articles were identified and collected.

NUMBER OF SOURCE DOCUMENTS

The total number of source documents identified as the result of the literature search is not known.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed to reach agreement in the formulation of the appropriateness criteria. The American College of Radiology (ACR) Appropriateness Criteria panels use a modified Delphi technique to arrive at consensus. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by the participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1 to 9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

If consensus cannot be reached by the Delphi technique, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible. If "No consensus" appears in the rating column, reasons for this decision are added to the comment sections.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria®

Clinical Condition: Acute Low Back Pain

Variant 1: Uncomplicated. No red flags. (Red flags defined in the text below.)

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, lumbar spine	2	
NUC, bone scan	2	
CT, lumbar spine, without contrast	2	
Myelogram	2	Usually done in conjunction with CT.
Myelogram/CT	2	Usually accompanied by plain film myelogram.
MRI, lumbar spine, without contrast	2	
MRI, lumbar spine, with and without contrast	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Low velocity trauma, osteoporosis, and/or age > 70.

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, lumbar spine, without contrast	8	
X-ray, lumbar spine	6	
CT, lumbar spine, without contrast	6	MRI preferred. CT useful if MRI contraindicated or unavailable.
NUC, bone scan	4	
MRI, lumbar spine, with and without	3	

Radiologic Exam Procedure	Appropriateness Rating	Comments
contrast		
Myelogram	1	Usually done in conjunction with CT.
Myelogram/CT	1	Usually accompanied by plain film myelogram.
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: Suspicion of cancer, infection, or immunosuppression.

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, lumbar spine, without contrast	8	
MRI, lumbar spine, with and without contrast	7	
X-ray, lumbar spine	5	
NUC, bone scan	5	
CT, lumbar spine, without contrast	4	
Myelogram	2	Usually done in conjunction with CT.
Myelogram/CT	2	Usually accompanied by plain film myelogram.
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 4: Radiculopathy.

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, lumbar spine, without contrast	8	
Myelogram/CT	5	MRI preferred. May be indicated if MRI contraindicated or nondiagnostic. Usually accompanied by plain film myelogram.
CT, lumbar spine, without contrast	5	
MRI, lumbar spine, with and without contrast	5	Indicated if noncontrast MRI nondiagnostic or confusing.
X-ray, lumbar spine	3	
NUC, bone scan	2	
Myelogram	2	Usually done in conjunction with CT.
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 5: Prior lumbar surgery.

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, lumbar spine, with and without contrast	8	Differentiate disc versus scar.
MRI, lumbar spine, without contrast	6	Contrast often necessary.
CT, lumbar spine, without contrast	6	Most useful in post fusion patients or when MRI contraindicated or confusing.
NUC, bone scan	5	Helps detect and localize painful pseudoarthrosis.
X-ray, lumbar spine	5	Flex/extension may be useful.
Myelogram/CT	5	Usually accompanied by plain film myelogram.

Radiologic Exam Procedure	Appropriateness Rating	Comments
Myelogram	2	Usually done in conjunction with CT.
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 6: Cauda equina syndrome.

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, lumbar spine, without contrast	9	Use of contrast depends on clinical circumstances.
MRI, lumbar spine, with and without contrast	8	Use of contrast depends on clinical circumstances.
Myelogram/CT	6	Useful if MRI nondiagnostic or contraindicated. Usually accompanied by plain film myelogram.
CT, lumbar spine, with and without contrast	4	May be indicated if MRI is confusing or contraindicated and myelography not feasible. Use of contrast depends on clinical circumstances.
X-ray, lumbar spine	3	
Myelogram	2	Usually done in conjunction with CT.
NUC, bone scan	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Acute low back pain (LBP) with or without radiculopathy (pain radiating down the leg[s]) is one of the most common health problems in the United States and is the leading cause of disability for persons younger than age 45. The cost of evaluating and treating acute LBP runs into billions of dollars annually, not including time lost from work.

Because of the high prevalence and high cost of dealing with this problem, government agencies have sponsored extensive studies that are now part of the growing body of literature on this subject. One of the earlier comprehensive studies was carried out in Quebec and was reported in the journal Spine in 1987. The U.S. Department of Health and Human Services convened a 23-member multidisciplinary panel of experts to review all of the literature on this subject, grade it, and develop a "Clinical Practice Guideline," which was published in December 1994. States have also convened similar panels in recent years, largely because of the rapidly rising workers' compensation claim burden being imposed on state budgets by LBP management.

It is now clear from the above studies that *uncomplicated* acute LBP is a benign, self-limited condition that does not warrant any imaging studies. The vast majority of these patients are back to their usual activities within 30 days. The challenge for the clinician, therefore, is to distinguish that small segment within this large patient population that should be evaluated further because of suspicion of a more serious problem.

Indications of a more complicated status, often termed "red flags," include the following:

1. Recent significant trauma, or milder trauma, age >50
2. Unexplained weight loss
3. Unexplained fever
4. Immunosuppression
5. History of cancer
6. Intravenous (IV) drug use
7. Prolonged use of corticosteroids, osteoporosis
8. Age >70
9. Focal neurologic deficit progressive or disabling symptoms
10. Duration greater than 6 weeks

Radiographs:

Radiographs are recommended when any of the above red flags are present. Lumbar radiography may be sufficient for the initial evaluation of these red flags:

1. Recent significant trauma (at any age)
2. Osteoporosis
3. Age >70

The initial evaluation of the LBP patient may require further imaging if red flags such as suspicion of cancer or infection are present.

Isotope Bone Scan

The role of the isotope bone scan in patients with acute LBP has changed in recent years with the wide availability of MRI and especially contrast-enhanced MRI. The bone scan is a moderately sensitive test for detecting the presence of tumor, infection, or occult fractures of the vertebrae but not for specifying the diagnosis. The yield is *very* low in the presence of normal radiographs and laboratory studies

and highest for patients with known malignancy. The test is contraindicated in pregnancy.

High-resolution isotope imaging including single photon emission computed tomography (SPECT), may localize the source of pain in patients with articular facet osteoarthritis prior to therapeutic facet injection. Similar scans may be helpful in detecting and localizing the site of painful pseudoarthrosis in patients following lumbar spinal fusion.

Plain and contrast-enhanced MRI has the ability to demonstrate inflammatory, neoplastic, and most traumatic lesions as well as show anatomic detail not available on isotope studies. Gadolinium-enhanced MRI reliably shows the presence and extent of spinal infection, and is useful in assessing therapy. MRI has therefore taken over the role of the isotope scan in many cases where the location of the lesion is known. The isotope scan remains invaluable when a survey of the entire skeleton is indicated (e.g., for metastatic disease).

Magnetic Resonance Imaging, Computed Tomography (CT), Myelography, Myelography/CT

Uncomplicated acute LBP (no red flags) does not warrant the use of any of this imaging studies. The early indiscriminate use of expensive imaging procedures in this common clinical setting has caused large increases in worker's compensation costs and in some cases has led to the perception that CT and MRI of the lumbar spine are not worth the cost. Adding to this controversy is the fact that nonspecific lumbar disc abnormalities are common, and can be demonstrated readily on myelography, CT, and MRI, even in asymptomatic patients.

The appropriate use of these imaging procedures is an important challenge that has been extensively addressed in the major reviews referenced herein (see the original guideline). For example, LBP complicated by "red flags" suggesting infection or tumor may justify early use of CT or MRI even if radiographs are negative. The most common indication for the use of these imaging procedures, however, is the clinical setting of LBP complicated by radiating pain (radiculopathy, sciatica) or cauda equina syndrome (bilateral leg weakness, urinary retention, saddle anesthesia), usually due to herniated disc and/or canal stenosis.

Magnetic Resonance Imaging

MRI of the lumbar spine has become the initial imaging modality of choice in complicated LBP, displacing myelography and CT in recent years. MRI is particularly efficacious for detecting "red flag" diagnoses, particularly using the STIR and fat-saturated T2 fast-spin-echo sequences. MR with contrast is useful for suspected infection and neoplasia. In postop patients, enhanced MRI allows distinction between disc and scar when there is extension of tissue beyond the interspace.

Computed Tomography

CT scans provide superior bone detail but are not quite as useful in depicting disc protrusions when compared with multiplanar MRI. With the added value associated with high quality reformatted sagittal and coronal plane images, CT is useful for depiction of spondylolysis, pseudoarthrosis, scoliosis, and for post-surgical evaluation of bone graft integrity, surgical fusion, and instrumentation.

Myelography/CT

"Plain" myelography was the mainstay of lumbar herniated disc diagnosis for decades. It is now usually combined with post-myelography CT. The *combined* study is complementary to plain CT or MRI and occasionally more accurate in diagnosing disc herniation, but suffers the disadvantage of requiring lumbar puncture and contrast injection. It may also be useful in surgical planning.

Thermography, Discography, CT Discography

Expert panels agreed that these imaging modalities were either too nonspecific (thermography) or carried additional risk (discography) not warranted in view of the efficacy of other less invasive imaging procedures. When other studies fail to localize the cause of pain, discography may occasionally be helpful. Although the images often depict nonspecific aging or degenerative changes, the injection itself may reproduce the patient's pain, which may have diagnostic value.

Abbreviations

- CT, computed tomography
- MRI, magnetic resonance imaging
- NUC, nuclear imaging

CLINICAL ALGORITHM(S)

Algorithms were not developed from criteria guidelines.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Selection of appropriate radiologic imaging procedures for evaluation of patients with acute low back pain (LBP) with or without radiculopathy

Subgroups Most Likely to Benefit

Patients that should be evaluated further because of suspicion of a more serious problem include:

- Recent significant trauma, or milder trauma, age >50
- Unexplained weight loss
- Unexplained fever
- Immunosuppression
- History of cancer
- Intravenous (IV) drug use
- Prolonged use of corticosteroids, osteoporosis
- Age >70
- Focal neurologic deficit progressive or disabling symptoms
- Duration greater than 6 weeks

POTENTIAL HARMS

The early indiscriminate use of expensive imaging procedures in this common clinical setting has caused large increases in worker's compensation costs and in some cases has led to the perception that computed tomography and magnetic resonance imaging of the lumbar spine is not worth the cost. The challenge for the clinician, therefore, is to distinguish that small segment within this large patient population that should be evaluated further because of suspicion of a more serious problem.

Subgroups Most Likely to be Harmed

- Patients with *uncomplicated* acute low back pain that undergo unnecessary imaging studies.
- Patients with *more complicated* acute low back pain that fail to undergo necessary imaging studies.

CONTRAINDICATIONS

CONTRAINDICATIONS

Isotope bone scan is contraindicated in pregnancy.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical

consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Personal Digital Assistant (PDA) Downloads

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

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Bradley WG Jr, Seidenwurm DJ, Brunberg JA, Davis PC, DE La Paz RL, Dormont D, Hackney DB, Jordan JE, Karis JP, Mukherji SK, Turski PA, Wippold FJ, Zimmerman RD, McDermott MW, Sloan MA, Expert Panel on Neurologic Imaging. Low back pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 7 p. [23 references]

ADAPTATION

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

DATE RELEASED

1996 (revised 2005)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

GUIDELINE COMMITTEE

Committee on Appropriateness Criteria, Expert Panel on Neurologic Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: William G. Bradley, Jr, MD, PhD; David J. Seidenwurm, MD; James A. Brunberg, MD; Patricia C. Davis, MD; Robert Louis De La Paz, MD; Pr. Didier Dormont; David B. Hackney, MD; John E. Jordan, MD; John P. Karis, MD; Suresh Kumar Mukherji, MD; Patrick A. Turski, MD; Franz J. Wippold II, MD; Robert D. Zimmerman, MD; Michael W. McDermott, MD; Michael A. Sloan, MD, MS

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Anderson RE, Drayer BP, Braffman B, Davis PC, Deck MD, Hasso AN, Johnson BA, Masaryk T, Pomeranz SJ, Seidenwurm D, Tanenbaum L, Masdeu JC. Acute low back pain--radiculopathy. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):479-85.

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

ACR Appropriateness Criteria® *Anytime*, *Anywhere*™ (PDA application). Available from the ACR Web site.

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- ACR Appropriateness Criteria®. Background and development. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on July 31, 2001. The information was verified by the guideline developer as of August 24, 2001. This summary was updated by ECRI on March 28, 2006. This summary was updated by ECRI Institute on May 17, 2007 following the U.S. Food and Drug Administration (FDA) advisory on Gadolinium-based contrast agents. This summary was updated by ECRI Institute on June 20, 2007 following the U.S. Food and Drug Administration (FDA) advisory on gadolinium-based contrast agents.

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