



Complete Summary

GUIDELINE TITLE

ACR Appropriateness Criteria® chronic hip pain.

BIBLIOGRAPHIC SOURCE(S)

Taljanovic M, Daffner RH, Weissman BN, Bennett DL, Bleba JS, Jacobson JA, Morrison WB, Resnik CS, Roberts CC, Schweitzer ME, Seeger LL, Wise JN, Payne WK, Expert Panel on Musculoskeletal Imaging. ACR Appropriateness Criteria® chronic hip pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2008. 8 p. [78 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: American College of Radiology (ACR), Expert Panel on Musculoskeletal Imaging. Chronic hip pain. Reston (VA): American College of Radiology (ACR); 2003. 6 p. (ACR appropriateness criteria). [31 references]

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

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

Chronic hip pain

GUIDELINE CATEGORY

Diagnosis
Evaluation

CLINICAL SPECIALTY

Family Practice
Internal Medicine
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 chronic hip pain

TARGET POPULATION

Patients with chronic hip pain

INTERVENTIONS AND PRACTICES CONSIDERED

1. X-ray, pelvis and hip
2. X-ray arthrography with anesthetic with or without corticosteroid
3. Magnetic resonance imaging (MRI) (with or without contrast)
4. MR arthrography
5. Ultrasound (US)
6. Computed tomography (CT) without contrast
7. CT arthrography
8. Nuclear medicine (NUC), technetium (Tc)-99m bone scan

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

Not stated

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 1-9, 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 this 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

The guideline developers reviewed published cost analyses.

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: Chronic Hip Pain

Variant 1: Initial evaluation for chronic hip pain. First test.

Radiologic Procedure	Rating	Comments	RRL*
X-ray pelvis	9		Low
X-ray hip	9	AP and lateral views of the affected hip.	Med
MRI hip without contrast	1		None
MRI hip with contrast	1		None

Radiologic Procedure	Rating	Comments	RRL*
US hip	1		None
CT hip without contrast	1		Med
CT arthrography hip	1		Med
MR arthrography hip	1		None
NUC Tc-99m bone scan hip	1		Med
X-ray arthrography hip with anesthetic ± corticosteroid	1		IP
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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

Variant 2: Radiographs negative, suspect osseous or surrounding soft-tissue abnormality, excluding osteoid osteoma.

Radiologic Procedure	Rating	Comments	RRL*
MRI hip with contrast	9		None
MRI hip with contrast	6	If required after review of noncontrast study. See comments regarding contrast in the text below under "Anticipated Exceptions."	None
MR arthrography hip	3	If femoroacetabular impingement or labral tear is suspected, see variant 5.	None
US hip	2		None
CT hip without contrast	2		Med
CT arthrography hip	2		Med
X-ray arthrography	2		IP

Radiologic Procedure	Rating	Comments	RRL*
hip with anesthetic ± corticosteroid			
NUC Tc-99m bone scan hip	1		Med
<u>Rating Scale: 1=Least appropriate, 9=Most appropriate</u>			*Relative Radiation Level

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

Variant 3: Radiographs negative, suspect osteonecrosis. Includes circumstance in which hip is asymptomatic but osteonecrosis is suspected due to known predisposing factors.

Radiologic Procedure	Rating	Comments	RRL*
MRI hip without contrast	9		None
NUC Tc-99m bone scan hip	5		Med
MRI hip with contrast	2		None
US hip	2		None
CT hip without contrast	2		Med
CT arthrography hip	2		Med
MR arthrography hip	2		None
X-ray arthrography hip with anesthetic ± corticosteroid	2		IP
<u>Rating Scale: 1=Least appropriate, 9=Most appropriate</u>			*Relative Radiation Level

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

Variant 4: Radiograph negative. Suspect osteoid osteoma.

Radiologic Procedure	Rating	Comments	RRL*
CT hip without contrast	9		Med
MRI hip without contrast	4	If CT is equivocal.	None
MRI hip with contrast	3	If CT is equivocal.	None
NUC Tc-99m bone scan hip	2		Med
CT arthrography hip	2		Med
X-ray arthrography hip with anesthetic ± corticosteroid	2		IP
US hip	1		None
MR arthrography hip	1		None
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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

Variant 5: Radiographs negative, suspect labral tear with or without clinical findings consistent with or suggestive of femoroacetabular impingement.

Radiologic Procedure	Rating	Comments	RRL*
MR arthrography hip	9	Use of high resolution (3T) in the future may obviate the need for contrast. See comments regarding contrast in the text below under "Anticipated Exceptions."	None
CT arthrography hip	6	An alternative if MRI is not available or contraindicated.	Med
MRI hip without contrast	4	Use of high resolution (3T) in the future may obviate the need for	None

Radiologic Procedure	Rating	Comments	RRL*
		contrast.	
MRI hip with contrast	2		None
CT hip without contrast	2		Med
US hip	2		None
NUC Tc-99m bone scan hip	2		Med
X-ray arthrography hip with anesthetic ± corticosteroid	2	At the request of the referring physician who has indicated hip as source of pain.	IP
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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

Variant 6: Radiographs negative or mild osteoarthritis. Suspect referred pain but wish to exclude hip.

Radiologic Procedure	Rating	Comments	RRL*
X-ray arthrography hip with anesthetic ± corticosteroid	9		IP
MRI hip without contrast	5	If another imaging study is indicated, MRI is the study of choice.	None
CT hip without contrast	2		Med
MR arthrography hip	2		None
CT arthrography hip	2		Med
US hip	2		None
NUC Tc-99m bone scan hip	2		Med

Radiologic Procedure	Rating	Comments	RRL*
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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

Variant 7: Radiographs positive, arthritis uncertain type. Infection not a consideration.

Radiologic Procedure	Rating	Comments	RRL*
MRI hip without contrast	4	If process is monoarticular or atypical.	None
MRI hip with contrast	2	Contrast rarely necessary.	None
CT hip without contrast	2		Med
US hip	2		None
CT arthrography hip	2		Med
MR arthrography hip	2		None
NUC Tc-99m bone scan hip	2		Med
X-ray arthrography hip with anesthetic ± corticosteroid	2		IP
<u>Rating Scale:</u> 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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

Variant 8: Radiographs positive, suggestive of pigmented villonodular synovitis or osteochondromatosis.

Radiologic Procedure	Rating	Comments	RRL*
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Radiologic Procedure	Rating	Comments	RRL*
MRI hip without contrast	9		None
CT arthrography hip	5	If MRI is not available or contraindicated.	Med
MRI hip with contrast	2		None
US hip	2		None
CT hip without contrast	2		Med
MR arthrography hip	2		None
NUC Tc-99m bone scan hip	2		Med
X-ray arthrography hip with anesthetic ± corticosteroid	2		IP
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

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

Summary of Literature Review

Chronic hip pain and/or groin pain is a perplexing clinical problem. Symptoms may be related to numerous etiologies, including trauma, neoplasms, and arthropathies. Pain may be due to osseous, intra-articular, periarticular, or soft-tissue pathology. Referred pain from the lumbar spine, sacroiliac joints, or knee may add to the potentially confusing clinical picture. Very few references deal specifically with chronic hip pain, although the imaging of specific disorders has been the subject of many articles.

Clinical data is essential for selecting the most appropriate imaging techniques in patients with chronic hip pain. Range of motion, gait abnormalities, locking or snapping, duration of symptoms, and pain patterns (e.g., worse at night, increased with exercise, relieved by aspirin) can be very useful for reducing the potentially long list of differential diagnoses. Radiographs should be obtained first in most, if not all cases and may provide specific information for common disorders such as osteoarthritis (OA) or less common disorders such as primary bone tumors. Whether the radiographs are normal or not, they are often of considerable value for the selection of additional techniques and for comparison

with studies such as magnetic resonance imaging (MRI) examinations and radionuclide bone scans.

MRI is frequently performed after initial radiographs to detect osseous, articular, or soft-tissue abnormalities. It is both highly sensitive and specific for detecting many abnormalities involving the hip or surrounding soft tissues and should in general be the first imaging technique used following radiographs. Osteonecrosis (ON) is probably the most common cause of chronic hip pain for which MRI is routinely used and the disorder for which the appearance and accuracy of MRI have been most thoroughly demonstrated in the literature.

Some investigators suggest that proton MRI spectroscopy may be a potential tool for predicting the risk for development of ON. MRI can also accurately detect ON in the asymptomatic, contralateral hip in those cases in which ON of the other hip has been diagnosed by radiographs.

Other causes of chronic painful hip for which MR has been used with considerable success include radiographically occult fractures, acute and chronic soft-tissue injuries, infection and inflammation, and tumors. Intravenous Gd-chelate agents are used to differentiate between joint fluid and synovitis. Generally, if the arthritis has an atypical appearance on radiographs, MRI may be helpful for further characterization and the intravenous contrast is rarely needed. The only exceptions to the use of MRI as the primary technique following radiographs are cases of suspected osteoid osteoma, for which computed tomography (CT) should be performed. One study reported that osteoid osteoma can be successfully imaged by dynamic contrast-enhanced MRI. However, the opinion of this expert panel is that the MRI without and/or with intravenous contrast is generally not widely utilized and most of time not needed in the diagnosis of osteoid osteoma and should be performed under discretion of radiologist if additional information is believed could be gained. For evaluating labral tears MR arthrography should probably be used. Direct MR arthrography with the intra-articular injection of a dilute (1:200) solution of Gd-chelate in saline has been established as a reliable technique for diagnosing of acetabular labral tears that are frequently associated with femoroacetabular impingement syndrome. However, several investigators suggest that high-resolution MRI with 3T may improve the visualization of the acetabular labrum and the hyaline articular cartilage, which may obviate the need for intra-articular contrast.

Other investigators have obtained satisfactory results in detecting labral and hyaline cartilage lesions with high-resolution MRI of the hip at 1.5T without intra-articular contrast. Hip cartilage abnormalities can also be successfully evaluated by high-resolution CT arthrography. Three-dimensional CT is an accurate tool to quantify the femoral head-neck concavity, providing a noninvasive assessment of hips at risk of femoroacetabular impingement. CT is also useful in evaluating hip dysplasia. Radiotracer uptake in the superior or superomedial aspect of the acetabular rim on skeletal scintigraphy has been reported as a characteristic feature of a labral tear. Absence of this pattern carries a high negative predictive value for the diagnosis.

Indirect MR arthrography, in which Gd-chelate contrast is administered by intravenous (IV) injection and diffuses into the joint space through the synovium, has been proposed as an alternative to direct MR arthrography for detecting intra-

articular disorders. It is faster and easier to perform than direct arthrography and does not require fluoroscopy. It suffers from less consistent enhancement of the joint space as well as inability to distend the joint capsule. Its value in the assessing the hyaline articular cartilage and the acetabular labrum of the hip is uncertain.

Diagnostic and therapeutic joint injections, which can be performed readily at the time of an MRI arthrogram or as dedicated procedures, are useful tools for confirming the location of pain and in some cases helping in its control for a short period. Joint aspiration is also critical in diagnosing the presence of infection or crystal disease. Local articular and extra-articular injections can define the symptomatic site and exclude referred symptoms. Intra-articular injection of a small amount of iodinated contrast medium under fluoroscopic guidance is used to confirm needle position. Sonography can also be used to localize fluid collections for aspiration. Sonography-guided iliopsoas bursal/peritendinous injections may be useful in determining the cause of hip pain.

In the presence of normal radiographs, and in the absence of ready access to MRI, a bone scan may be a useful technique. Radionuclide bone scans are effective for detecting or excluding subtle osseous abnormalities.

Other techniques such as fluoroscopic motion studies (with or without intra-articular contrast) and ultrasound (US) are useful to evaluate articular and peri-articular conditions such as snapping iliopsoas tendon. In one study, real-time US was used to evaluate the snapping iliopsoas tendon. This method is noninvasive, which is an advantage compared with injection of the tendon sheath and fluoroscopic evaluation.

Summary and Recommendations

Imaging of chronic hip pain is a broad subject, and the imaging assessment of numerous disorders has been described in the literature. Clinical data play an important role in patients with chronic hip pain. Radiographs should be obtained as the first imaging study and, in general, MRI should be obtained as the next imaging study except in cases of suspected osteoid osteoma or labral tear as discussed above. Direct MR arthrography should be performed if acetabular labral tear is suspected, including patients with clinical evidence of femoroacetabular impingement. Use of higher field MRI (3T) may obviate the need for intra-articular contrast. Other imaging techniques as well as image-guided aspiration have selected roles to play in certain disorders.

Anticipated Exceptions

Nephrogenic systemic fibrosis (NSF, also known as nephrogenic fibrosing dermopathy) was first identified in 1997 and has recently generated substantial concern among radiologists, referring doctors and lay people. Until the last few years, gadolinium-based MR contrast agents were widely believed to be almost universally well tolerated, extremely safe and non-nephrotoxic, even when used in patients with impaired renal function. All available experience suggests that these agents remain generally very safe, but recently some patients with renal failure who have been exposed to gadolinium contrast agents (the percentage is unclear) have developed NSF, a syndrome that can be fatal. Further studies are necessary

to determine what the exact relationships are between gadolinium-containing contrast agents, their specific components and stoichiometry, patient renal function and NSF. Current theory links the development of NSF to the administration of relatively high doses (e.g., >0.2mM/kg) and to agents in which the gadolinium is least strongly chelated. The U.S. Food and Drug Administration (FDA) has recently issued a "black box" warning concerning these contrast agents (http://www.fda.gov/cder/drug/InfoSheets/HCP/gcca_200705HCP.pdf).

This warning recommends that, until further information is available, gadolinium contrast agents should not be administered to patients with either acute or significant chronic kidney disease (estimated glomerular filtration rate [GFR] <30 mL/min/1.73m²), recent liver or kidney transplant or hepato-renal syndrome, unless a risk-benefit assessment suggests that the benefit of administration in the particular patient clearly outweighs the potential risk(s).

Abbreviations

- CT, computed tomography
- IP, in progress
- Med, medium
- MRI, magnetic resonance imaging
- NUC, nuclear medicine
- Tc, technetium
- US, ultrasound

Relative Radiation Level	Effective Dose Estimated Range
None	0
Minimal	<0.1 mSv
Low	0.1-1 mSv
Medium	1-10 mSv
High	10-100 mSv

*RRL assignments are not included for some examinations. The RRL assignments for the IP (in progress) exams will be available in future releases.

CLINICAL ALGORITHM(S)

None provided

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 diagnosis and evaluation of patients with chronic hip pain

POTENTIAL HARMS

Some patients with renal failure who have been exposed to gadolinium contrast agents (the percentage is unclear) have developed nephrogenic systemic fibrosis (NSF), a syndrome that can be fatal. The U.S. Food and Drug Administration (FDA) has recently issued a "black box" warning concerning these contrast agents. This warning recommends that, until further information is available, gadolinium contrast agents should not be administered to patients with either acute or significant chronic kidney disease (estimated glomerular filtration rate [GFR] <30 mL/min/1.73m²), recent liver or kidney transplant or hepato-renal syndrome, unless a risk-benefit assessment suggests that the benefit of administration in the particular patient clearly outweighs the potential risk(s).

Relative Radiation Level (RRL)

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Additional information regarding radiation dose assessment for imaging examinations can be found in the American College of Radiology (ACR) Appropriateness Criteria® Radiation Dose Assessment Introduction document (see "Availability of Companion Documents" field).

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

Living with Illness

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Taljanovic M, Daffner RH, Weissman BN, Bennett DL, Bleba JS, Jacobson JA, Morrison WB, Resnik CS, Roberts CC, Schweitzer ME, Seeger LL, Wise JN, Payne WK, Expert Panel on Musculoskeletal Imaging. ACR Appropriateness Criteria® chronic hip pain. [online publication]. Reston (VA): American College of Radiology (ACR); 2008. 8 p. [78 references]

ADAPTATION

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

DATE RELEASED

1998 (revised 2008)

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 Musculoskeletal Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Mihra Taljanovic, MD; Richard H. Daffner, MD; Barbara N. Weissman, MD; D. Lee Bennett, MD; Judy S. Blebea, MD; Jon A. Jacobson, MD; William B. Morrison, MD; Charles S. Resnik, MD; Catherine C. Roberts, MD; Mark E. Schweitzer, MD; Leanne L. Seeger, MD; James N. Wise, MD; William K. Payne, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

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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 are 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](#).
- ACR Appropriateness Criteria® radiation dose assessment introduction. American College of Radiology. 2 p. Electronic copies: Available from the [American College of Radiology Web site](#).

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on May 6, 2001. The information was verified by the guideline developer as of June 29, 2001. This NGC summary was updated by ECRI on November 12, 2004. The information was verified by the guideline developer on December 21, 2004. This summary was updated by ECRI Institute on June 29, 2009.

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