Complete Summary

GUIDELINE TITLE

Headache.

BIBLIOGRAPHIC SOURCE(S)

Jordan JE, Seidenwurm DJ, Davis PC, Brunberg JA, De La Paz RL, Dormont PD, Hackney DB, Karis JP, Mukherji SK, Turski PA, Wippold FJ II, Zimmerman RD, McDermott MW, Sloan MA, Expert Panel on Neurologic Imaging. Headache. [online publication]. Reston (VA): American College of Radiology (ACR); 2006. 8 p. [48 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Strain JD, Strife JL, Kushner DC, Babcock DS, Cohen HL, Gelfand MJ, Hernandez RJ, McAlister WH, Parker BR, Royal SA, Slovis TL, Smith WL, Rothner AD. Headache. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):855-60.

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).

COMPLETE SUMMARY CONTENT

** REGULATORY ALERT **
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SCOPE

DISEASE/CONDITION(S)

Headache

GUIDELINE CATEGORY

Diagnosis

CLINICAL SPECIALTY

Family Practice
Internal Medicine
Neurology
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 headache

TARGET POPULATION

Patients with headache

INTERVENTIONS AND PRACTICES CONSIDERED

1. Computed tomography (CT), head
    - Without contrast
    - With contrast
    - Without and with contrast
2. Computed tomography angiography (CTA)

    - Head
    - Head and neck
3. Magnetic resonance imaging (MRI), head
    - Without contrast
    - Without or with contrast
4. Magnetic resonance angiography (MRA)
    - Head, with or without contrast
    - Head and neck, with or without contrast
5. Invasive (INV), catheter angiography
6. Ultrasound (US)
    - Transcranial
    - Neck (carotid Duplex)
7. Nuclear imaging (NUC), single photon emission computer tomography (SPECT), head
8. Positron-emission tomography (PET)
9. X-ray, skull

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

Review of Published Meta-Analyses
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 for reaching 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 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 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

When considering such a common disorder as headache, the indications for the use of imaging procedures become particularly relevant. This is particularly true in view of the emerging and rapidly evolving technologies in use today. In frequent conditions, performing low-yield studies is more likely to result in false positive results, with the consequent risk of causing additional and unnecessary procedures to be performed. As indicated above, the yield of positive studies in patients referred with isolated, nontraumatic headache is about 0.4%. In terms of

cost, if one assumes the cost of a CT scan to be $400 and an MRI to be $900, to detect a lesion with CT would cost $100,000 and with MRI, $225,000.

One should not assume, however, that there is no social benefit in negative imaging studies in the setting of headache. Indeed, headache symptoms can be quite ominous and onerous to the one suffering them, and there can be tremendous costs with respect to productivity and quality-of-life issues. Moreover, health care providers perceive value in imaging headache when the fear of litigation is accounted for. While it is beyond the scope of this review to assess the factors and inherent value of negative imaging tests in headache imaging, it must be emphasized that costs of detection or screening in imaging headache are always overstated when the value of negative results are not factored into the analysis.

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: Headache

Variant 1: Worsened chronic headache. History of headache.

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, head, without contrast	4	
CT, head, without and with contrast	4	
MRI, head, without and with contrast	4	
MRI, head, without contrast	4	
MRA, head, with or without contrast	2	

Radiologic Exam Procedure	Appropriateness Rating	Comments
CTA, head	2	
INV, catheter angiography	2	
NUC, SPECT, head	2	
US, transcranial	1	
PET	1	
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: Sudden onset of severe headache ("Worst headache of one's life, thunderclap headache").

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, head, without contrast	9	
MRA, head, with or without contrast	8	
CTA, head	8	
MRI, head, without contrast	7	May be helpful after CT depending on CT findings
INV, catheter angiography	7	
MRI, head, without and with contrast	6	May be helpful after CT depending on CT findings
CT, head, without and with contrast	6	
US, transcranial	2	
NUC, SPECT, head	2	
PET	1	
Appropriateness Criteria Scale		

Radiologic Exam Procedure	Appropriateness Rating	Comments
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: Sudden onset of unilateral headache, or suspected carotid or vertebral dissection or ipsilateral Horner's syndrome.

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRA, head and neck, with or without contrast	8	Usage of CT versus MRI depends on local preference and availability
CTA, head and neck	8	Usage of CT versus MRI depends on local preference and availability
CT, head, without contrast	8	
MRI, head, without and with contrast	8	With diffusion-weighted sequences
MRI, head, without contrast	8	With diffusion-weighted sequences
INV, catheter angiography	7	
CT, head, without and with contrast	6	
US, neck (carotid Duplex)	3	
NUC, SPECT, head	2	
US, transcranial	2	
PET	1	
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: Headache, suspected complication of sinusitis and/or mastoiditis.

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, head, without and with contrast	8	
CT, head, without contrast	7	Include sinuses
MRI, head, without contrast	7	
CT, head, without and with contrast	6	Include sinuses
X-ray, skull	4	
US, transcranial	2	
NUC, SPECT, head	1	
PET	1	
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: New headache in patient older than age 60. Sedimentation rate higher than 55, temporal tenderness. Suspected temporal arteritis.

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, head, without contrast	8	With diffusion-weighed sequences
MRI, head, without and with contrast	7	With diffusion-weighed sequences
CT, head, without contrast	6	
CT, head, without and with contrast	5	
MRA, head and neck, with or without	5	

Radiologic Exam Procedure	Appropriateness Rating	Comments
contrast		
CTA, head and neck	5	
INV, catheter angiography	4	If noninvasive imaging unrewarding
US, transcranial	2	
NUC, SPECT, head	1	
PET	1	
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: New headache in HIV-positive individual.

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, head, without contrast	8	
MRI, head, without and with contrast	8	
CT, head, without contrast	6	If MRI not available
CT, head, without and with contrast	5	
MRA, head, with or without contrast	3	If vascular lesion suspected
CTA, head	3	If vascular lesion suspected
US, transcranial	2	
PET	2	Useful if indeterminate mass present
NUC, SPECT, head	2	Useful if indeterminate mass present
INV, catheter angiography	2	If noninvasive imaging non-rewarding

Radiologic Exam Procedure	Appropriateness Rating	Comments
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 7: New headache in pregnant patient.

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, head, without contrast	8	
CT, head, without contrast	8	
MRI, head, without and with contrast	5	Pregnancy is a relative contraindication to gadolinium administration. Reserve for urgent medical necessity.
MRA, head, with or without contrast	5	MR venography (MRV) should also be performed.
CT, head, with contrast	3	For urgent medical necessity only
CTA, head	2	If MRI not available, contraindicated, or inconclusive
US, transcranial	1	
NUC, SPECT, head	1	
PET	1	
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 8: New headache. Suspected meningitis/encephalitis.

Radiologic Exam Procedure	Appropriateness Rating	Comments

Radiologic Exam Procedure	Appropriateness Rating	Comments
MRI, head, without and with contrast	8	
CT, head, without contrast	8	To exclude intracranial pressure
MRI, head, without contrast	6	Needs contrast
MRA, head, with or without contrast	6	MRV should also be performed.
CT, head, without and with contrast	6	MRI preferable, depending on availability
CTA, head	3	Useful for problem solving or if there is a strong suspicion of vascular disease
US, transcranial	1	
NUC, SPECT, head	1	
PET	1	
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.

Headache is one of the most frequent ailments of the human race. Studies of the prevalence of headache: of any kind in populations have estimated frequencies of 11%-48% in children and 6%-71% in adults. As with migraine, age, gender, and case definition may largely account for this variance. However, a higher prevalence of headache has been found by surveys in Europe and North America than by those of Asian and South American countries. A survey of the Canadian population showed that only about 20% of people there are headache free. Prevalence of migraine shows a clear-cut gender difference, affecting about 15%-18% of women and 6% of men. It occurs most commonly in men and women 25-55 years of age. Muscle contraction or tension accounts for most of the nonmigraine headaches encountered in population surveys.

By comparison, the frequency of pathology that can present with headache is rather small. The yearly incidence of brain tumors in the United States is 46 per 100,000. For subarachnoid hemorrhage, the yearly incidence is 9 per 100,000. Arteriovenous malformations (AVMs) are about one-tenth as frequent as saccular aneurysms. Only a subset of these patients presents with isolated headache. In a retrospective review of the presentation of 111 brain tumors, headaches were a symptom in 48%, equally for primary and metastatic brain tumors. Headaches

were similar to tension type in 77%, migraine-type in 9%, and other types in 14%. The typical headache was bifrontal but worse ipsilaterally, and was the worst symptom in only 45% of patients. Other studies have found a higher frequency, but sometimes the headache preceded the diagnosis of brain tumor by several years, bringing up the possibility of an association with this common complaint, rather than causality. In children with brain tumors, headache was present in 62%, more often with infratentorial tumors. Because tumors are rare and only about half of them present with headache, it becomes apparent that if all patients with headache undergo imaging procedures, a large proportion of the studies will be negative.

Several studies have confirmed the low yield of imaging procedures in individuals presenting with isolated headache—that is, headache unaccompanied by other neurological findings. Most of them are retrospective reviews. The patients were referred for imaging because the referring physician suspected pathology detectable by imaging or the patients requested the study to be certain that they did not have a brain tumor. A prospective review of 293 CT scans ordered in an ambulatory family practice setting disclosed that most of them were ordered because the clinician suspected that a tumor (49%) or a subarachnoid hemorrhage (SAH) (9%) might be present. Fifty-nine (17%) were ordered because of patient expectation or medico-legal concerns.

A meta-analysis of several studies on the yield of CT or MRI in patients with headache but normal neurological examination was performed. Most of the larger studies were performed with first-generation CT. Of 897 studies in patients with migraine, only four were positive, three for tumor and one for an arteriovenous malformation (AVM), giving a 0.4% yield of potentially treatable lesions. In patients with unspecified headache, 1,825 scans yielded a total of 43 lesions (21 tumors, 8 hydrocephalus, 6 AVMs, 5 subdural hematomas, and 3 aneurysms), for a 2.4% yield of potentially treatable lesions. However, two studies in this group were performed at tertiary referral centers (the Mayo Clinic and the Cleveland Clinic) in the early days of CT and had a 500% higher rate of clinically important findings than more recent prospective studies. If these two studies are not included among those performed in patients with unspecified headache, the total number of potentially treatable lesions is reduced to three in 725 studies (0.4%). A potential bias for the early series, however, is that the studies were performed with first-generation equipment, which was likely to have less sensitivity than currently used units.

Of 1,999 scans reported in other series, including mostly CT, only 21 (1%) disclosed treatable lesions. Most of the positive cases occurred in the series which included an unspecified number of patients with abnormal neurological findings. If this series is excluded from the analysis, only nine out of 1,999 patients (0.5%) had treatable findings. In a retrospective review of charts from 1,074 consecutive emergency department patients who underwent cranial CT, headache was associated with low yield of abnormality.

When considering such a common disorder as headache, the indications for the use of imaging procedures become particularly relevant. This is particularly true in view of the emerging and rapidly evolving technologies in use today. In frequent conditions, performing low-yield studies is more likely to result in false positive results, with the consequent risk of causing additional and unnecessary

procedures to be performed. As indicated above, the yield of positive studies in patients referred with isolated, nontraumatic headache is about 0.4%. In terms of cost, if one assumes the cost of a CT scan to be $400 and an MRI to be $900, to detect a lesion with CT would cost $100,000 and with MRI, $225,000.

One should not assume, however, that there is no social benefit in negative imaging studies in the setting of headache. Indeed, headache symptoms can be quite ominous and onerous to the one suffering them, and there can be tremendous costs with respect to productivity and quality-of-life issues. Moreover, health care providers perceive value in imaging headache when the fear of litigation is accounted for. While it is beyond the scope of this guideline to assess the factors and inherent value of negative imaging tests in headache imaging, it must be emphasized that costs of detection or screening in imaging headache are always overstated when the value of negative results are not factored into the analysis.

Some headache presentations require further discussion. A patient presenting with a sudden, severe headache ("the worst headache of my life", "thunderclap headache"), particularly if it is not a migraine or if the pattern of the headache is clearly different from the patient's usual headaches, is at a significantly higher risk of having an SAH, which is more often related to an aneurysm than to an AVM. In a combination of three series, as many as 165 of 350 patients (47%) presenting with thunderclap headache had an SAH. If the CT scan is negative, a lumbar puncture should be performed to disclose additional instances of SAH. These patients may require MRA, CTA, and/or catheter angiography to determine the nature and location of the lesion.

Sudden, severe unilateral headache in a young patient, particularly when it radiates into the neck and is accompanied by ipsilateral Horner's syndrome, may be the result of arterial dissection of the carotid or vertebral arteries. In a series of 161 patients, headache was reported by 68% of them, and, when present, it was the initial manifestation in 47% of those with carotid dissection and in 33% of those with vertebral dissection. Although some of these patients had stroke-like syndromes, others did not, or they developed them several days after an initial presentation with isolated headache. The pattern of radiation will often differ enough to make the patient suspect that this is not a regular headache. In this case, MRI, MRA, CTA and/or catheter angiography are particularly useful to identify the nature of the lesion. Current practice is to anticoagulate these patients to prevent thrombosis at the site of the stenotic lesion. For this reason, identification of the pathology is important.

In 315 children with isolated headache scanned at Boston Children's Hospital, 4% had surgical space-occupying lesions. Sleep-related headache and no family history of migraine were the strongest predictors. The comments made above about selected populations referred to tertiary care centers apply to this example also.

Patients older than 55 years with new onset of headache in the temple regions, particularly when they have tender superficial temporal arteries, should be studied for temporal arteritis. Treatment with steroids may forestall vision loss or brainstem strokes.

New onset of headache in populations predisposed to intracranial pathology also results in a much higher yield of findings by CT or MRI. For instance, a series of 49 HIV-positive individuals had an 82% yield of positive pathology. Although cryptococcal meningitis was most common (39%), toxoplasmosis was a close second (16%), and a number of patients had other mass lesions identified by CT. Patients with known cancer should also be scanned when a headache develops or changes in characteristics. In the Andes population, the rate of headache is low, whereas cysticercosis is common. As a result, CT of patients with headache yielded a 33% rate of positive studies.

In summary, screening patients with isolated, nontraumatic headache by means of CT or MRI is not warranted. However, for some types of headache or populations at risk these procedures are more likely to be positive. Thunderclap headaches, headaches radiating to the neck, and temporal headaches in an older individual are examples of headaches for which imaging procedures may be helpful. Patients with suspected meningitis and those presenting with headaches in pregnancy also often pose important diagnostic challenges. HIV-positive individuals, cancer patients, or other populations at high risk of intracranial disease also should be screened when presenting with new-onset headaches.

Abbreviations

- CT, computed tomography
- CTA, computed tomography angiography
- HIV, human immunodeficiency virus
- INV, invasive
- MRA, magnetic resonance angiography
- MRI, magnetic resonance imaging
- NUC, nuclear imaging
- PET, positron-emission tomography
- SPECT, single photon emission computer tomography
- US, ultrasound

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 headache

POTENTIAL HARMS

Low-yield imaging studies (e. g., computed tomography [CT], magnetic resonance imaging [MRI]) are likely to render false positive results, with the consequent risk of causing additional and unnecessary procedures to be performed.

CONTRAINDICATIONS

CONTRAINDICATIONS

Pregnancy is a relative contraindication to gadolinium administration

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
Living with Illness

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Jordan JE, Seidenwurm DJ, Davis PC, Brunberg JA, De La Paz RL, Dormont PD, Hackney DB, Karis JP, Mukherji SK, Turski PA, Wippold FJ II, Zimmerman RD, McDermott MW, Sloan MA, Expert Panel on Neurologic Imaging. Headache. [online publication]. Reston (VA): American College of Radiology (ACR); 2006. 8 p. [48 references]

ADAPTATION

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

DATE RELEASED

1996 (revised 2006)

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

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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: Strain JD, Strife JL, Kushner DC, Babcock DS, Cohen HL, Gelfand MJ, Hernandez RJ, McAlister WH, Parker BR, Royal SA, Slovis TL, Smith WL, Rothner AD. Headache. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):855-60.

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 NGC summary was completed by ECRI on August 26, 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

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