Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

ACR Appropriateness Criteria® chest pain suggestive of acute coronary syndrome.

Bibliographic Source(s)

Mammen L, Abbara S, Dorbala S, Javidan-Nejad C, Julsrud PR, Kirsch J, Kramer CM, Krishnamurthy R, Laroia AT, Shah AB, Vogel-Claussen J, White RD, Woodard PK, Expert Panel on Cardiac Imaging. ACR Appropriateness CriteriaÂ® chest pain suggestive of acute coronary syndrome [online publication]. Reston (VA): American College of Radiology (ACR); 2014. 10 p. [62 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Mammen L, White RD, Woodard PK, Carr JJ, Earls JP, Hendel RC, Ho VB, Hoffman U, Ryan T, Schoepf J, White CS, Expert Panel on Cardiac Imaging. ACR Appropriateness Criteria® chest pain, suggestive of acute coronary syndrome. [online publication]. Reston (VA): American College of Radiology (ACR); 2010. 6 p. [58 references]

Recommendations

Major Recommendations

ACR Appropriateness Criteria®

Clinical Condition: Chest Pain Suggestive of Acute Coronary Syndrome

Radiologic Procedure	Rating	Comments	RRL*
SPECT MPI rest and stress	8	This procedure is appropriate for intermediate-to-high likelihood for coronary artery disease. There is abundant literature available on clinical utility.	
Arteriography coronary	8	This procedure is the gold standard and is invasive.	
SPECT MPI rest only	7	In the setting of ongoing chest pain, this procedure has	

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative

Radiologic Procedure	Rating	Comments	RRL*
		a high negative predictive value. Tc-99m is the most commonly used radionuclide agent for this test. RRL may be higher if thallium (Tl-201) used.	
US echocardiography transthoracic stress	7	Consider this procedure when resting echo and cardiac enzymes are normal.	O
US echocardiography transthoracic resting	6	This procedure is primarily used for evaluating wall-motion abnormalities and aortic dissection.	O
CTA coronary arteries with contrast	6	Consider this procedure for those patients with low-to-intermediate likelihood for coronary artery disease, in the absence of cardiac enzyme elevation and ischemic ST changes.	
X-ray chest	5	This procedure is primarily a survey for noncardiac etiologies of chest pain.	
CT chest with contrast	5	This procedure is primarily for noncardiac etiologies such as pulmonary embolism and aortic dissection.	
MRI heart function with stress without and with contrast	5	For this procedure there is limited experience in the clinical setting and lack of availability. See statement regarding contrast in the text below under "Anticipated Exceptions."	O
MRI heart function with stress without contrast	4	For this procedure there is limited experience in the clinical setting and lack of availability.	O
Rb-82 PET heart stress	4	For this procedure there is lack of widespread use and availability.	
MRI heart function and morphology without and with contrast	4	This procedure is primarily for the possibility of aortic dissection. See statement regarding contrast in the text below under "Anticipated Exceptions."	O
CT chest without and with contrast	3		
MRI heart function and morphology without contrast	3	This procedure is primarily for the possibility of aortic dissection.	O
US echocardiography transesophageal	3	This procedure has a relative contraindication for acute coronary syndrome.	O
CT coronary calcium	2	This procedure is not validated in the acute setting.	
MRA coronary arteries without contrast	2	This procedure is technically challenging, and there is a lack of widespread use as well as protocol availability.	O
MRA coronary arteries without and with contrast	2	This procedure is technically challenging, and there is a lack of widespread use as well as protocol availability.	O
CT chest without contrast	2		

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

Radiologic Procedure	Rating	Comments	RRL*

*Relative Radiation Level

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

Summary of Literature Review

Acute chest pain is a frequent presenting complaint in emergency departments. Along with other important disease entities such as aortic dissection and pulmonary embolus, such patient symptoms may question the possibility of acute myocardial ischemia. Acute coronary syndromes (ACS) include ST-segment elevation myocardial infarction (STEMI), non-STEMI (NSTEMI), and unstable angina (UA). Being able to establish the diagnosis rapidly and accurately may be lifesaving. The immediate cardiac workup consists of an electrocardiogram (ECG) and cardiac biomarkers. In the acute setting, even if there are no ischemic changes on ECG, a cardiac workup is often indicated. Because research has demonstrated that patients having a STEMI have improved outcomes if percutaneous intervention is performed within 90 minutes of arrival to a hospital, if the patient is suspected of having an ACS, the patient will be urgently transferred to a cardiac catheterization laboratory for invasive angiography and potential coronary revascularization. Depending on institutional policy, non-STEMI patients with ACS may only undergo coronary angiography during conventional operating hours of the catheterization laboratory.

In stable patients without ST elevation, an initially conservative approach may be considered. In patients with active chest pain, an ECG with no ischemic changes, and an initial negative troponin, rest single-photon emission computed tomography (SPECT) has been demonstrated to be useful. However, it has been shown to be less sensitive than stress SPECT imaging if the chest pain has subsided. Stress echocardiography may be equally considered in acute chest pain patients as well. Noninvasive imaging may be indicated for risk stratification before discharge in both low- and intermediate-risk patients who have been free of ischemia for a minimum of 12 to 24 hours. This approach also serves to identify patients with latent ischemia who could benefit from more aggressive revascularization.

In clinically stable UA/NSTEMI patients, cardiac catheterization in a nonemergent setting has advantages which may outweigh the benefits of performing urgent intervention. This select group of patients with UA/NSTEMI may be selected for "early but nonurgent angiography/intervention," also referred to as "upstream therapy." In the interval prior to angiography, these patients may benefit from aggressive antiplatelet therapy. In this group of patients selected for nonurgent invasive angiography, noninvasive imaging may be the intermediate step between the emergency department and discharge, improving confidence regarding the safety of the discharge.

Noncoronary etiologies for chest pain may also be established with imaging, the results of which may alter the patient's post-discharge care altogether. It is not uncommon for a patient to have acute chest pain occurring from other cardiovascular causes or noncardiac etiologies. Patients may have predisposing cardiac risk factors and pain characteristics that place them in the triage category of intermediate probability for coronary artery disease (CAD). Further cardiac risk stratification of this subgroup of patients is recommended before discharge, and noninvasive imaging is often necessary to exclude ischemia as an etiology.

The available noninvasive cardiac imaging modalities include chest radiography (CXR), rest SPECT myocardial perfusion imaging (MPI), stress SPECT MPI, echocardiography (transthoracic and transesophageal), multidetector computed tomography (MDCT), positron emission tomography (PET) (metabolic and perfusion), and magnetic resonance imaging (MRI).

Chest Radiography

The utility of the CXR is primarily for ruling out conditions that may masquerade as an acute myocardial ischemia as well as defining secondary findings that may accompany acute myocardial infarction. Acute pulmonary edema can be seen on CXR without enlargement of the cardiac silhouette in patients with acute myocardial infarction and no prior history of ischemic damage or associated mitral valve disease. However, CXR is insufficient to confirm or exclude the presence of significant CAD. Other cardiovascular entities, such as aortic aneurysms, aortic dissections, and pulmonary embolism may be suggested from the CXR but with lower sensitivity than other imaging modalities such as MDCT. Noncardiac findings associated with chest pain that can be identified on the CXR include pneumothorax, fractured ribs, pleural effusions, and pneumonia.

Single-Photon Emission Computed Tomography/Myocardial Perfusion Imaging

SPECT perfusion scintigraphy is an important test in the assessment for myocardial ischemia. In patients with active chest pain, an ECG with no ischemic changes, and an initial negative troponin, rest SPECT has been demonstrated to be the test of choice. It has been shown to be less sensitive than stress SPECT imaging, however, if performed after the chest pain has subsided. The commonly used radionuclide agents are Tl-201 (thallium) chloride and (technetium) Tc-99m-labeled agents (e.g., sestamibi, tetrofosmin). There is abundant literature describing the use of SPECT in ACS. The absence of a perfusion defect on an acute rest study is associated with a very high negative predictive value for ACS evaluation. A perfusion defect which becomes apparent or becomes larger during exercise stress or pharmacologic stress defines ischemic myocardium.

Recently new software algorithms such as iterative reconstruction, maximum a posteriori noise regularization, and resolution-recovery, and new hardware and detector materials have become available, allowing for image acquisitions at significantly shorter acquisition times (one fifth to one half of previous acquisition times), or alternatively at lower doses compared to conventional algorithms.

Echocardiography

Stress echocardiography has been shown to be a modality equivalent to stress SPECT MPI in the acute setting in low-to-intermediate risk patients, with a stress pharmacologic agent such as dobutamine, inducing focal wall motion abnormalities in the region(s) of ischemia. Overall left ventricular function can also be assessed. The presence of left ventricular aneurysms, pseudoaneurysms, effusions, and valvular dysfunction can be determined as well.

The primary utility of transesophageal echocardiography (TEE) in the setting of acute chest pain is in ruling out aortic dissection in unstable patients. TEE is also used to further define valvular dysfunction or intracardiac thrombus, which can be sequelae of ischemic events in the subacute setting. Because of the invasive nature of TEE and because there is limited information that can be added in the setting of acute chest pain, this modality is generally not indicated in the workup of acute chest-pain patients.

Multidetector Computed Tomography

In stable patients with suggested ACS with a low or intermediate probability of CAD, in whom follow-up ECG and cardiac biomarker measurements are normal, performance of a noninvasive coronary imaging test (i.e., coronary CT angiography [CCTA]) is reasonable as an alternative to stress testing or selective coronary angiography. CCTA has a high negative predictive value for the detection of coronary atherosclerosis with or without significant stenosis and may be a potential alternative to stress imaging in the emergency department setting in patients at low to intermediate risk for CAD. Although some of these studies have been criticized for including patients that have a very low pretest probability of CAD, large prospective trials attest to the high negative predictive value and good prognosis of a "normal" CTA in patients with low-risk acute chest pain. The advantages of cost and time savings while maintaining safety in the emergency department have also been pursued. In addition, CT has a well-established role in identifying aortic aneurysms, aortic dissections, pulmonary embolism, pericardial disease, and lung parenchymal disease, all of which can also present with acute chest pain.

Evaluation of patients with CCTA results may be limited in patients with high heart rates (>65 beats/min) uncontrolled by beta blocker or other rate-limiting agents, and in patients who have intractable arrhythmias. Patients who have calcium scores greater than 400–600 Agatston Units have limitations, although the role of calcium score in the acute setting has not been established.

Recent advances in cardiac CT imaging technology allow for further radiation dose reduction in CCTA examinations; new and available new dose-reducing techniques include prospective triggering, adaptive statistical iterative reconstruction, and high-pitch spiral acquisition. However, these newer low-dose techniques may not be the appropriate in all patients due to their dependency on a combination of factors, including heart rate, rhythm, and large body size. Thus, although these techniques are promising in terms of reducing patient radiation dose, there may be patients for whom these radiation dose techniques are not optimal, such as an obese, elderly patient with an arrhythmia who might best benefit from retrospective gating in order to allow assessment of the coronary arteries at multiple phases of the cardiac cycle. In addition, not all scanners are capable of all radiation dose reduction techniques. In all cases, the imaging physician must select the appropriate combination of imaging parameters to acquire a diagnostic examination at a radiation dose that is as low as reasonably achievable (ALARA).

Positron Emission Tomography

A stress PET examination can reliably demonstrate myocardial blood flow using rubidium-82 (Rb-82) or nitrogen-13 (N-13) ammonia. Limited data are available for PET perfusion studies in the setting of acute chest pain, although there is growing evidence for diagnostic and prognostic applications in chronic coronary disease. PET can also document anaerobic metabolism using fluorine-18-2-fluoro-2-deoxy-D-glucose and other metabolic tracers. This technology is not universally available and, therefore, is less well studied in the workup of the acute chest pain patient.

Magnetic Resonance Imaging

MRI has modest utility in patients with suspected ischemia in the acute setting. The principal limitations to this technique are equipment availability and the high level of expertise required of technologists and interpreting physicians. Access to the patient may be more difficult in the magnetic environment if the patient's stability should deteriorate.

However, cardiac MRI delayed post contrast imaging and edema-weighted imaging provides definitive assessment of the size, distribution, and transmural extent of acute or remote myocardial infarction. Cine MRI has utility in demonstrating wall motion abnormalities which may accompany acute or chronic ischemic heart disease, and first-pass stress contrast-enhanced perfusion cardiac MRI can demonstrate myocardial abnormalities.

MRI, like CT, can also identify noncardiac findings of chest pain, such as aortic dissection. Cardiac MR has been shown to be cost-effective in the

workup of intermediate-risk chest pain patients in the emergency department. Although MR coronary angiography has not been established in general practice, both angiographic and phase-contrast flow continue to be developed for coronary artery assessment in research centers.

Summary

- A number of imaging modalities may be used in evaluating stable patients with chest pain suggestive of ACS and who are not selected for urgent cardiac catheterization.
- Although cardiac catheterization is the mainstay for evaluation of patients in whom a diagnosis of NSTEMI is made, in the clinically stable patient with angina or UA, alternative noninvasive imaging modalities may be appropriate.
- Noninvasive imaging in this setting includes MPI, coronary CT angiography, cardiac MRI, and stress echocardiography. These tests may be performed as an intermediate step and may improve confidence regarding the safety of discharge from the emergency department.

Anticipated Exceptions

Nephrogenic systemic fibrosis (NSF) is a disorder with a scleroderma-like presentation and a spectrum of manifestations that can range from limited clinical sequelae to fatality. It appears to be related to both underlying severe renal dysfunction and the administration of gadolinium-based contrast agents. It has occurred primarily in patients on dialysis, rarely in patients with very limited glomerular filtration rate (GFR) (i.e., <30 mL/min/1.73 m^2), and almost never in other patients. There is growing literature regarding NSF. Although some controversy and lack of clarity remain, there is a consensus that it is advisable to avoid all gadolinium-based contrast agents in dialysis-dependent patients unless the possible benefits clearly outweigh the risk, and to limit the type and amount in patients with estimated GFR rates <30 mL/min/1.73 m^2. For more information, please see the American College of Radiology (ACR) Manual on Contrast Media (see the "Availability of Companion Documents" field).

Abbreviations

- CT, computed tomography
- CTA, computed tomography angiography
- MPI, myocardial perfusion imaging
- MRA, magnetic resonance angiography
- MRI, magnetic resonance imaging
- PET, positron emission tomography
- Rb-82, rubidium-82
- RRL, relative radiation level
- SPECT, single-photon emission computed tomography
- Tc-99m, technetium 99-m
- US, ultrasound

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
	<0.1 mSv	<0.03 mSv
	0.1-1 mSv	0.03-0.3 mSv
	1-10 mSv	0.3-3 mSv
	10-30 mSv	3-10 mSv
	30-100 mSv	10-30 mSv
*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."		

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

Chest pain suggestive of acute coronary syndrome

Guideline Category

Diagnosis

Evaluation

Clinical Specialty

Cardiology

Emergency Medicine

Internal Medicine

Nuclear Medicine

Radiology

Intended Users

Health Plans

Hospitals

Managed Care Organizations

Physicians

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of radiologic procedures for patients with chest pain suggestive of acute coronary syndrome

Target Population

Patients with chest pain suggestive of acute coronary syndrome

Interventions and Practices Considered

1. Single-photon emission computed tomography (SPECT) myocardial perfusion imaging (MPI)
    - Rest and stress
    - Rest only
2. Ultrasound (US) echocardiography

    - Transthoracic stress
    - Transthoracic resting
    - Transesophageal
3. Computed tomography angiography (CTA) coronary arteries with contrast
4. Computed tomography (CT)
    - Chest with contrast
    - Chest without and with contrast
    - Chest without contrast
    - Coronary calcium
5. Coronary arteriography
6. X-ray, chest
7. Magnetic resonance imaging (MRI)
    - Heart function with stress without and with contrast
    - Heart function with stress without contrast
    - Heart function and morphology without and with contrast
8. Magnetic resonance angiography (MRA)
    - Coronary arteries without contrast
    - Coronary arteries without and with contrast
9. Rubidium-82 (Rb-82) positron emission tomography (PET) heart stress

Major Outcomes Considered

- Utility of radiologic examinations in differential diagnosis
- Sensitivity, specificity and predictive value of radiologic examinations
- Mortality
- Death
- Myocardial infarction

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Procedure

Staff search in PubMed only for peer reviewed medical literature for routine searches. Any article or guideline may be used by the author in the narrative but those materials may have been identified outside of the routine literature search process.

The Medline literature search is based on keywords provided by the topic author. The two general classes of keywords are those related to the condition (e.g., ankle pain, fever) and those that describe the diagnostic or therapeutic intervention of interest (e.g., mammography, MRI).

The search terms and parameters are manipulated to produce the most relevant, current evidence to address the American College of Radiology Appropriateness Criteria (ACR AC) topic being reviewed or developed. Combining the clinical conditions and diagnostic modalities or therapeutic procedures narrows the search to be relevant to the topic. Exploding the term "diagnostic imaging" captures relevant results for diagnostic topics.

The following criteria/limits are used in the searches:

1. Articles that have abstracts available and are concerned with humans
2. Restrict the search to the year prior to the last topic update or in some cases the author of the topic may specify which year range to use in the search. For new topics, the year range is restricted to the last 10 years unless the topic author provides other instructions.

3. May restrict the search to Adults only or Pediatrics only.
4. Articles consisting of only summaries or case reports are often excluded from final results.

The search strategy may be revised to improve the output as needed.

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 Given)

Rating Scheme for the Strength of the Evidence

Study Quality Category Definitions

Category 1 - The study is well-designed and accounts for common biases.

Category 2 - The study is moderately well-designed and accounts for most common biases.

Category 3 - There are important study design limitations.

Category 4 - The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:

a. The study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description).
b. The study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence.
c. The study is an expert opinion or consensus document.

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

The topic author drafts or revises the narrative text summarizing the evidence found in the literature. American College of Radiology (ACR) staff draft an evidence table based on the analysis of the selected literature. These tables rate the strength of the evidence (study quality) for all articles included in the narrative text.

The expert panel reviews the narrative text, evidence table, and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the table. Each individual panel member assigns a rating based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development document (see the "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

Rating Appropriateness

The appropriateness ratings for each of the procedures included in the Appropriateness Criteria topics are determined using a modified Delphi methodology. A series of surveys are conducted to elicit each panelist's expert interpretation of the evidence, based on the available data, regarding the appropriateness of an imaging or therapeutic procedure for a specific clinical scenario. American College of Radiology (ACR) staff distributes surveys to the panelists along with the evidence table and narrative. Each panelist interprets the available evidence and rates each procedure. The surveys are completed by panelists without consulting other panelists. The appropriateness rating scale is an ordinal scale that uses integers from 1 to 9 grouped into three categories: 1, 2, or 3 are in the category "usually not appropriate"; 4, 5, or 6 are in the category "may be appropriate"; and 7, 8, or 9 are in the category "usually appropriate." Each panel member assigns one rating for each procedure for a clinical scenario. The ratings assigned by each panel member are presented in a table displaying the frequency distribution of the ratings without identifying which members provided any particular rating.

If consensus is reached, the median rating is assigned as the panel's final recommendation/rating. Consensus is defined as eighty percent (80%) agreement within a rating category. A maximum of three rounds may be conducted to reach consensus. Consensus among the panel members must be achieved to determine the final rating for each procedure.

If consensus is not reached, the panel is convened by conference call. The strengths and weaknesses of each imaging procedure that has not reached consensus are discussed and a final rating is proposed. If the panelists on the call agree, the rating is proposed as the panel's consensus. The document is circulated to all the panelists to make the final determination. If consensus cannot be reached on the call or when the document is circulated, "No consensus" appears in the rating column and the reasons for this decision are added to the comment sections.

This modified Delphi method enables each panelist to express individual interpretations of the evidence and his or her expert opinion without excessive influence from fellow panelists in a simple, standardized and economical process. A more detailed explanation of the complete process can be found in additional methodology documents found on the ACR Web site (see also the "Availability of Companion Documents" field).

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

Cardiac magnetic resonance (MR) has been shown to be cost-effective in the workup of intermediate-risk chest pain patients in the emergency department.

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.

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 the evaluation of patients with chest pain suggestive of acute coronary syndrome

Potential Harms

Gadolinium-based Contrast Agents

Nephrogenic systemic fibrosis (NSF) is a disorder with a scleroderma-like presentation and a spectrum of manifestations that can range from limited clinical sequelae to fatality. It appears to be related to both underlying severe renal dysfunction and the administration of gadolinium-based contrast agents. It has occurred primarily in patients on dialysis, rarely in patients with very limited glomerular filtration rate (GFR) (i.e., <30 mL/min/1.73 m^2), and almost never in other patients. Although some controversy and lack of clarity remain, there is a consensus that it is advisable to avoid all gadolinium-based contrast agents in dialysis-dependent patients unless the possible benefits clearly outweigh the risk, and to limit the type and amount in patients with estimated GFR rates <30 mL/min/1.73 m^2. For more information, please see the American College of Radiology (ACR) Manual on Contrast Media (see the "Availability of Companion Documents" field).

Relative Radiation Level

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 (RRL) 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. Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared to those specified for adults. Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® Radiation Dose Assessment Introduction document (see the "Availability of Companion Documents" field).

Contraindications

Contraindications

Transesophageal ultrasound echocardiography is relatively contraindicated in acute coronary syndrome.

Qualifying Statements

Qualifying Statements

The 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 examinations 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.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Timeliness

Identifying Information and Availability

Bibliographic Source(s)

Mammen L, Abbara S, Dorbala S, Javidan-Nejad C, Julsrud PR, Kirsch J, Kramer CM, Krishnamurthy R, Laroia AT, Shah AB, Vogel-Claussen J, White RD, Woodard PK, Expert Panel on Cardiac Imaging. ACR Appropriateness CriteriaÂ® chest pain suggestive of acute coronary syndrome [online publication]. Reston (VA): American College of Radiology (ACR); 2014. 10 p. [62 references]

Adaptation

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

Date Released

1995 (revised 2014)

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 Cardiac Imaging

Composition of Group That Authored the Guideline

Panel Members: Leena Mammen, MD (*Principal Author*); Suhny Abbara, MD (*Panel Vice-chair*); Sharmila Dorbala, MD; Cylen Javidan-Nejad, MD; Paul R. Julsrud, MD; Jacobo Kirsch, MD; Christopher M. Kramer, MD; Rajesh Krishnamurthy, MD; Archana T. Laroia, MD; Amar B. Shah, MD; Jens Vogel-Claussen, MD; Richard D. White, MD; Pamela K. Woodard, MD (*Panel Chair*)

Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Mammen L, White RD, Woodard PK, Carr JJ, Earls JP, Hendel RC, Ho VB, Hoffman U, Ryan T, Schoepf J, White CS, Expert Panel on Cardiac Imaging. ACR Appropriateness Criteria® chest pain, suggestive of acute coronary syndrome. [online publication]. Reston (VA): American College of Radiology (ACR); 2010. 6 p. [58 references]

Guideline Availability

Electronic copies: Available from the American College of Radiology (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®. Overview. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available from the American College of Radiology (ACR) Web site .
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 2013 Apr. 1 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria®. Evidence table development – diagnostic studies. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria®. Radiation dose assessment introduction. Reston (VA): American College of Radiology; 2031 Nov. 3 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria®. Manual on contrast media. Reston (VA): American College of Radiology; 90 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria®. Procedure information. Reston (VA): American College of Radiology; 2013 Apr. 1 p. Electronic copies: Available from the ACR Web site .
- ACR Appropriateness Criteria® acute chest pain suggestive of acute coronary syndrome. Evidence table. Reston (VA): American College of Radiology; 2014. 28 p. Electronic copies: Available from the ACR Web site .

Patient Resources

None available

NGC Status

This summary was completed by ECRI Institute on November 8, 2010. This summary was updated by ECRI Institute on January 13, 2011 following the U.S. Food and Drug Administration (FDA) advisory on gadolinium-based contrast agents. This summary was updated by ECRI Institute on July 16, 2014.

Copyright Statement

Instructions for downloading, use, and reproduction of the American College of Radiology (ACR) Appropriateness Criteria™ may be found on the ACR Web site .

Disclaimer

NGC Disclaimer

The National Guideline Clearinghouseâ„¢ (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the NGC Inclusion Criteria which may be found at http://www.guideline.gov/about/inclusion-criteria.aspx.

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.