Complete Summary

GUIDELINE TITLE

Suspected physical abuse - child.

BIBLIOGRAPHIC SOURCE(S)

Slovis TL, Smith WL, Strain JD, Cohen HL, Fordham L, Gelfand MJ, Gunderman R, McAlister WH, Tosi L, Expert Panel on Pediatric Imaging. Suspected physical abuse--child. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 5 p. [33 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Slovis TL, Smith W, Kushner DC, Babcock DS, Cohen HL, Gelfand MJ, Hernandez RJ, McAlister WH, Parker BR, Royal S, Strain JD, Strife JL, Kanda MB, Myer E, Decter RM, Moreland MS, Eggli D. Imaging the child with suspected physical abuse. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):805-9.

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

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
QUALIFYING STATEMENTS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY
DISCLAIMER

SCOPE

DISEASE/CONDITION(S)

Physical abuse of children

GUIDELINE CATEGORY

Diagnosis

CLINICAL SPECIALTY

Family Practice
Neurology
Pediatrics
Radiology

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations for children suspected of physical abuse

TARGET POPULATION

Children suspected of physical abuse

INTERVENTIONS AND PRACTICES CONSIDERED

1. X-ray, skeletal survey
2. Magnetic resonance imaging (MRI)
    - Brain
    - Abdomen and pelvis
3. Computed tomography (CT)
    - Brain
    - Abdomen and pelvis, with contrast
    - Abdomen and pelvis, without contrast
4. Nuclear medicine (NUC), bone scan
5. Ultrasound (US)
    - Abdomen
    - Cranial
    - Abdomen and pelvis

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

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

NUMBER OF SOURCE DOCUMENTS

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

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

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

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed 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 to 9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

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

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

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

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

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

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria®

Clinical Condition: Suspected Physical Abuse - Child

Variant 1: Child 2 years or less, no facial signs or symptoms.

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, skeletal survey	9	Includes at least 2 views of the skull.
MRI, brain	5	For evidentiary purposes only.

Radiologic Exam Procedure	Appropriateness Rating	Comments
NUC, bone scan	4	May be useful in selected cases. For evidentiary purposes only.
CT, brain	2	
US, abdomen	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

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

Variant 2: Child 2 years or less, head trauma by history, no focal findings, no neurologic abnormality.

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, skeletal survey	9	Includes at least 2 views of the skull.
MRI, brain	7	
CT, brain	6	
NUC, bone scan	4	May be useful in selected cases. For evidentiary purposes only.
US, abdomen	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

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

Variant 3: Child up to age 5, seizures or neurologic signs and symptoms, with or without physical findings.

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, skeletal survey	9	Includes at least 2 views of the skull.
CT, brain	9	
MRI, brain	8	May be appropriate as alternative to CT

Radiologic Exam Procedure	Appropriateness Rating	Comments
		or following CT.
NUC, bone scan	4	May be useful in selected cases. For evidentiary purposes only.
US, cranial	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

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

Variant 4: Child of any age, visceral injuries, discrepancy with history, physical and laboratory examinations inconclusive.

Radiologic Exam Procedure	Appropriateness Rating	Comments
X-ray, skeletal survey	9	Includes at least 2 views of the skull.
CT, abdomen and pelvis, with contrast	9	
US, abdomen and pelvis	2	
MRI, abdomen and pelvis	2	
CT, abdomen and pelvis, without contrast	2	
CT, brain	2	
MRI, brain	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

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

The kind of imaging necessary in a child suspected of abuse depends on the child's age, signs, and symptoms. Therefore, the suffering child may enter this algorithmic sequence at several points.

Entry point one: Child 2 years of age or younger with a clinical suspicion of abuse but no focal signs or symptoms.

The most basic imaging examination is the skeletal survey, composed of frontal and lateral views of the skull and single frontal views of the long bones, lateral spine, frontal chest, and abdomen. Since rib fracture may be the only skeletal manifestation of abuse, oblique radiographs of the ribs are included in the initial skeletal survey. The goal is to detect fractures for documentation of abuse.

When results of this survey are negative but a clinical suspicion remains high and documentation is still necessary, a bone scan is obtained with meticulous attention to position and technique (pin-hole collimators and differential counts of the metaphysics), and with the understanding that skull fractures will usually not have increased uptake of the radioisotope. A bone scan is especially good for diagnosing rib, spine, pelvic, and acromion fractures.

Entry point two: Child 2 years of age or younger with a history of head trauma but no focal findings or neurologic abnormality. A clinical suspicion of abuse is present.

A skeletal survey, as described above, is obtained. A cross-sectional image procedure of the brain in a child with a normal neurological exam doesn't alter the nature of medical treatment nor the child's clinical course. When the skeletal survey is negative but a strong clinical suspicion of abuse exists, a full skull series and MRI can be obtained for legal documentation of abuse. MRI has a far greater sensitivity for detecting and dating intracranial injury than CT and avoids unnecessary radiation (see MRI sequences, diffusion-weighted imaging (DWI), etc., in entry point 3 below).

If the skeletal survey is negative but a clinical suspicion remains high and documentation is still necessary, a bone scan may be subsequently obtained.

Entry point three: Child up to 5 years of age with neurologic signs and symptoms, and suspicion of abuse with or without other physical findings.

The child needs a careful clinical assessment. If the child is critically ill with serious signs of neurologic injury an immediate noncontrast CT scan of the brain should be performed. If this scan does not detect significant lesions needing rapid neurosurgical intervention, the child should be stabilized and an urgent MR study of the brain performed with a minimum of diffusion imaging, susceptibility imaging, T1, T2, and inversion recovery sequences.

If the child is clinically stable with neurologic symptoms (transient loss of consciousness, seizure, altered mental status, confirmed presence of retinal hemorrhages) MR may be used for the initial neurologic imaging evaluation. Sequences for susceptibility, T1, T2, and inversion recovery should be used. Diffusion imaging may be used depending on the severity of the child's illness.

In either case, if the child is less than 2 years of age, a skeletal survey as defined in entry point one should be performed, and should include a full skull series if fracture is not otherwise documented by CT.

Entry point four: A child of any age with visceral injury that is discrepant with the history, and either the physical examination or the laboratory studies or both do not provide a satisfactory explanation. The visceral injuries would include:

a. pancreatic pseudocyst
b. adrenal hemorrhage
c. free air (bowel perforation) after blunt trauma
d. contusion or laceration of viscera
e. traumatic bladder perforation

In this setting, all of these injuries (a-e) should be considered signs of abuse. If the patient is less than 2 years of age, skeletal survey should be done.

In all probability, the child would already have had the injury detected by contrast-enhanced CT (CECT) with oral or intravenous contrast. If a CT was not obtained, it would be the first imaging test. Follow-up imaging relates to the disease process, not abuse. Some authorities prefer not to use oral contrast for this CT study; however, there is not a clear documentation of the superiority of either technique; therefore, the issue of oral contrast should be left to the discretion of the radiologist.

It is of interest that of all the cases of bowel perforation after blunt trauma (incidence 1 to 5%), most of them (65%) are found in abused children.

Abbreviations

- CT, computed tomography
- MRI, magnetic resonance imaging
- NUC, nuclear medicine
- 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 children suspected of physical abuse

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Personal Digital Assistant (PDA) Downloads

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

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Slovis TL, Smith WL, Strain JD, Cohen HL, Fordham L, Gelfand MJ, Gunderman R, McAlister WH, Tosi L, Expert Panel on Pediatric Imaging. Suspected physical abuse--child. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 5 p. [33 references]

ADAPTATION

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

DATE RELEASED

1995 (revised 2005)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

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 Pediatric Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Thomas L. Slovis, MD; Wilbur L. Smith, MD; John D. Strain, MD; Harris L. Cohen, MD; Lynn Fordham, MD; Michael J. Gelfand, MD; Richard Gunderman, MD, PhD; William H. McAlister, MD; Laura Tosi, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

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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

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