Complete Summary

GUIDELINE TITLE

Suspected small bowel obstruction.

BIBLIOGRAPHIC SOURCE(S)

Ros PR, Huprich JE, Bree RL, Foley WD, Gay SB, Glick SN, Heiken JP, Levine MS, Rosen MP, Shuman WP, Greene FL, Expert Panel on Gastrointestinal Imaging. Suspected small bowel obstruction. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 5 p. [43 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: DiSantis DJ, Ralls PW, Balfe DM, Bree RL, Glick SN, Levine MS, Megibow AJ, Saini S, Shuman WP, Greene FL, Laine LA, Lillemoe K. The patient with suspected small bowel obstruction: imaging strategies. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):121-4.

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

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SCOPE

DISEASE/CONDITION(S)

Small bowel obstruction

GUIDELINE CATEGORY

Diagnosis

CLINICAL SPECIALTY

Emergency Medicine
Gastroenterology
Internal Medicine
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 suspected of a small bowel obstruction

TARGET POPULATION

Patients with suspected small bowel obstruction

INTERVENTIONS AND PRACTICES CONSIDERED

1. Computed tomography (CT)
    - Abdomen and pelvis without oral contrast, with intravenous (IV) contrast
    - Abdomen and pelvis with oral water soluble contrast, with IV contrast
    - Abdomen and pelvis with oral dilute barium contrast, with IV contrast
    - Enterography with IV and water or water density contrast
    - Enteroclysis (CT-E)
2. X-ray
    - Supine and upright abdomen
    - Small bowel follow-through with oral ingestion
    - Small bowel enteroclysis
3. Magnetic resonance imaging (MRI), abdomen
4. Ultrasound (US), abdomen

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

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

NUMBER OF SOURCE DOCUMENTS

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

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

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

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed to reach agreement in the formulation of the appropriateness criteria. The American College of Radiology (ACR) Appropriateness Criteria panels use a modified Delphi technique to arrive at consensus. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as

developed by the topic leader(s). Questionnaires are completed by the participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1 to 9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

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

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

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

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

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

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria®

Clinical Condition: Suspected Small Bowel Obstruction (SBO)

Variant 1: Suspected complete or high-grade partial SBO.

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, abdomen and pelvis without oral	8	

Radiologic Exam Procedure	Appropriateness Rating	Comments
contrast with IV contrast		
X-ray, supine and upright abdomen	7	
CT, abdomen and pelvis with oral water soluble contrast, with IV contrast	5	Positive contrast in the bowel can obscure the etiology of the obstruction and enhancement of the mucosal bowel lumen.
CT, abdomen and pelvis with oral dilute barium contrast, with IV contrast	5	Positive contrast in the bowel can obscure the etiology of the obstruction and enhancement of the mucosal bowel lumen.
CT, enterography with IV and water or water density contrast	4	
CT, enteroclysis (CT-E)	4	
X-ray, small bowel follow-through with oral ingestion	4	
X-ray, small bowel enteroclysis	4	
MRI, abdomen	4	
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: Suspected intermittent or low-grade SBO.

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, abdomen and pelvis with oral water soluble contrast, with IV contrast	7	All are equally acceptable choices dependent on institutional preference and available resources.

Radiologic Exam Procedure	Appropriateness Rating	Comments
CT, abdomen and pelvis with oral dilute barium contrast, with IV contrast	7	All are equally acceptable choices dependent on institutional preference and available resources.
CT, enterography with IV and water or water density contrast	7	All are equally acceptable choices dependent on institutional preference and available resources.
CT, enteroclysis (CT-E)	7	All are equally acceptable choices dependent on institutional preference and available resources.
X-ray, small bowel follow-through with oral ingestion	7	All are equally acceptable choices dependent on institutional preference and available resources.
X-ray, small bowel enteroclysis	7	All are equally acceptable choices dependent on institutional preference and available resources.
X-ray, supine and upright abdomen	5	
CT, abdomen and pelvis without oral contrast, with IV contrast	4	
MRI, abdomen	4	
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.

There is no single generally accepted approach to evaluate patients with suspected small bowel obstruction (SBO). This, in part, reflects not only the differing perspectives of investigators who have written on the topic (surgeons and radiologists) but also the increasing application of sophisticated imaging studies. The diagnostic approach also depends upon the clinical presentation (i.e., acute high-grade vs. low-grade or intermittent.)

Plain film radiography has been the traditional starting point for imaging evaluation of suspected SBO. It must be conceded, however, that studies testing the utility of plain film have yielded quite disparate results. While some

investigators report 80 to 90% success in diagnosing SBO using radiographs, an overall accuracy equal to that of CT, others have achieved rates only in the 30 to 70% range. In some even less encouraging studies, abdomen films have proved to be of little to no help in assessing the site or cause of SBO, or even to be misleading in 20 to 40% of patients.

In light of these inconsistent results, it is reasonable to expect that abdomen radiographs will not be definitive in many patients with suspected SBO. In such a setting, gastrointestinal contrast studies (small bowel follow-through (SBFT), enteroclysis, barium enema) or cross-sectional imaging studies (CT, US, MRI) are options.

The single contrast barium enema with attempted reflux into the distal ileum can exclude colonic obstruction and may occasionally aid in distinguishing SBO from an adynamic ileus. It is unreliable, however, for localizing and characterizing the site of SBO, as well as for identifying patients who will need surgery.

Opinion is divided on the usefulness of SBFT with orally administered barium. Some investigators have found this study useful for management of suspected SBO in 68 to 100% of cases. Because SBFT suffers from nonuniform small bowel filling, inability to test distensibility, and limitations posed by intermittent fluoroscopy, some authorities argue that enteroclysis is the appropriate examination in problematic SBO cases.

Methods of examination that challenge the distensibility of the small bowel, such as standard or CT enteroclysis, offer improved sensitivity and specificity over standard barium small bowel and CT exams in evaluating suspected intermittent or low-grade small bowel obstruction. Evidence is compelling that enteroclysis is highly reliable in pinpointing sites of low- and high-grade obstruction, as well as in distinguishing adhesions from obstructing neoplasms. CT enteroclysis (CT-E) should be considered as an alternative, especially in patients with a history of malignancy. Enteroclysis has low patient acceptance and is dependent on the skill of the radiologist performing the examination.

CT enterography does not require intubation of the small bowel and therefore has greater patient acceptance and is less dependent on the technical skill of the radiologist. CT enterography with a water density contrast agent offers an alternative to CT enteroclysis, particularly where there is reluctance to use pharmacologic manipulation of small bowel activity. This is particularly true in patients with partial or intermittent small bowel obstruction. Its clinical usefulness in this clinical scenario has not yet been convincingly established, however.

Evaluation of suspected small obstruction with oral water-soluble contrast agents is controversial. Some authors point out that this technique is disadvantageous because of the potential for intravascular volume depletion and electrolyte imbalance, plus the poorer imaging characteristics as compared with barium. Others have found both low osmolar and high osmolar water-soluble agents to be useful in diagnosis, amelioration, and management of small bowel obstruction. Their stance is bolstered by reports of admittedly rare complications with barium studies, such as conversion from partial to complete obstruction. A randomized controlled study concluded that water-soluble contrast administration was not useful in the management of these patients.

Convincing studies have confirmed the usefulness of the standard CT examination in suspected high-grade SBO. Diagnostic accuracy of more than 90% has been reported, with success in distinguishing SBO from ileus and in identifying the cause of obstruction. Patients with suspected high grade obstruction do not require additional oral contrast medium since the fluid in the bowel provides adequate contrast. Low-grade obstruction is a relative "blind spot" for standard CT. One study demonstrated correct diagnosis in fewer than half of such cases. Newer multidetector (MDCT) scanners with MPR capabilities have been noticeably more effective in evaluating SBO and other abdominal pathology, particularly when coronal reconstructions are added. CT is an excellent means of detecting complications of bowel obstruction such as ischemia and strangulation.

Largely because of the success of enteroclysis and CT in diagnosing and characterizing SBO, US has been used rarely in the United States; therefore data are scanty. In skilled hands, sonography has been reported to have a nearly 90% success rate in diagnosing SBO. In the pediatric age group, sonography has proven useful in evaluating intussusception, midgut volvulus, and other causes of SBO. CT proved superior to US in one study.

Increasing evidence supports MRI's capability to detect and characterize SBO. Because of its higher cost and convincing lack of incremental diagnostic gain as compared with CT, MRI should not be used routinely for evaluating suspected SBO. Pregnant patients are a particularly good population to offer MRI for SBO.

Conclusions

Standard CT has emerged as the preeminent imaging modality for the evaluation of SBO and should be considered in the initial evaluation of patients with suspected high-grade SBO. The barium enema and small bowel examination play a less significant role and should not be used as a primary modality in the diagnosis of acute small bowel obstruction.

If intermittent or low-grade small bowel obstruction is a chief diagnostic concern, standard or CT-E is appropriate. CT-E offers several advantages over standard CT and enteroclysis techniques, but its role in evaluation of small bowel obstruction is unclear at this time.

Abbreviations

- CT, computed tomography
- CT-E, CT enteroclysis
- IV, intravenous
- MRI, magnetic resonance imaging
- 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 suspected of a small bowel obstruction

POTENTIAL HARMS

- Abdomen radiographs will not be definitive in many patients with suspected small bowel obstruction (SBO)
- Single contrast barium enema is unreliable for localizing and characterizing the site of SBO, as well as for identifying patients who will need surgery. Rare complications with barium studies, such as conversion from partial to complete obstruction have been reported.
- Evaluation of suspected SBO with oral water-soluble contrast agents has the potential for intravascular volume depletion and electrolyte imbalance, plus the poorer imaging characteristics as compared with barium.

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)

Ros PR, Huprich JE, Bree RL, Foley WD, Gay SB, Glick SN, Heiken JP, Levine MS, Rosen MP, Shuman WP, Greene FL, Expert Panel on Gastrointestinal Imaging. Suspected small bowel obstruction. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 5 p. [43 references]

ADAPTATION

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

DATE RELEASED

1996 (revised 2005)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

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

GUIDELINE COMMITTEE

Committee on Appropriateness Criteria, Expert Panel on Gastrointestinal Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Pablo R. Ros, MD, MPH; James E. Huprich, MD; Robert L. Bree, MD, MHSA; W. Dennis Foley, MD; Spencer B. Gay, MD; Seth N. Glick, MD; Jay P. Heiken, MD; Marc S. Levine, MD; Max Paul Rosen, MD, MPH; William P. Shuman, MD; Frederick L. Greene, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

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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 is available:

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

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on March 19, 2001. The information was verified by the guideline developer on March 29, 2001. This summary was updated by ECRI on March 27, 2006.

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