Revised 2013 (Resolution 26)*

ACR PRACTICE PARAMETER FOR THE PERFORMANCE OF A BARIUM SMALL BOWEL EXAMINATION IN ADULTS

PREAMBLE

This document is an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. Practice Parameters and Technical Standards are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care[1]. For these reasons and those set forth below, the American College of Radiology and our collaborating medical specialty societies caution against the use of these documents in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the practitioner in light of all the circumstances presented. Thus, an approach that differs from the guidance in this document, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in this document when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations of available resources, or advances in knowledge or technology subsequent to publication of this document. However, a practitioner who employs an approach substantially different from the guidance in this document is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation, and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. Therefore, it should be recognized that adherence to the guidance in this document will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of this document is to assist practitioners in achieving this objective.

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[1] Iowa Medical Society and Iowa Society of Anesthesiologists v. Iowa Board of Nursing, ___ N.W.2d ___ (Iowa 2013) Iowa Supreme Court refuses to find that the *ACR Technical Standard for Management of the Use of Radiation in Fluoroscopic Procedures* (Revised 2008) sets a national standard for who may perform fluoroscopic procedures in light of the standard's stated purpose that ACR standards are educational tools and not intended to establish a legal standard of care. See also, Stanley v. McCarver, 63 P.3d 1076 (Ariz. App. 2003) where in a concurring opinion the Court stated that "published standards or guidelines of specialty medical organizations are useful in determining the duty owed or the standard of care applicable in a given situation" even though ACR standards themselves do not establish the standard of care.

I. INTRODUCTION

Radiographic examination of the small bowel after oral ingestion of barium is a proven and useful procedure. The purpose is to establish the presence or absence of a disease and its nature by opacifying the small bowel with contrast and taking sequential images. The goal is to obtain a diagnostic quality study visualizing the small bowel with the minimum radiation dose necessary. Peroral pneumoncolon is an adjunct technique that involves retrograde insufflation of air into the terminal ileum via a rectal tube.

Computed Tomography (CT) is often selected as the imaging examination of choice for patients with suspected small bowel obstruction since it does not rely on contrast reaching the site of obstruction to allow identification of its location and is considerably quicker than barium small bowel series [1]. A small bowel examination with water soluble contrast has been suggested as a predictor of nonoperative resolution of small bowel obstruction [2] and as a therapeutic agent [3]. For some indications, such as inflammatory bowel disease and unexplained gastrointestinal (GI) bleeding, the barium small bowel examination has been largely supplanted by CT enterography or MR enterography [4-8] and is no longer the examination of choice.

In some situations, enteroclysis may also be chosen over the barium small bowel examination to provide better bowel distention and mucosal detail (see the ACR–SAR Practice Parameter for the Performance of an Enteroclysis Examination in Adults).

II. INDICATIONS

A. Indications for barium small bowel examination include, but are not limited to:

1. Suspected or known small bowel obstruction.
2. Evaluation for presence of primary or secondary neoplasm(s).
3. Inflammatory bowel disease.
4. Unexplained GI bleeding.
5. Malabsorption.
6. Evaluation of postsurgical anatomy.
7. Evaluation of enteric fistula.
8. Evaluation for an asymptomatic stricture prior to capsule enteroscopy.
9. History of small bowel disease.
10. Protein losing enteropathy.

B. Pertinent history and symptoms serving as indications for a barium small bowel examination include, but are not limited to:

1. Abdominal pain.
2. Diarrhea.
3. Unexplained GI bleeding or anemia.
4. Abdominal masses.
5. Possible small bowel obstruction.
6. Enteric fistula.
7. Possible postoperative leak.

For the pregnant or potentially pregnant patient, see the ACR–SPR Practice Parameter for Imaging Pregnant or Potentially Pregnant Adolescents and Women with Ionizing Radiation.

III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

For physician, Qualified Medical Physicist, registered radiologist assistant, and radiologic technologist qualifications see the ACR–SPR Practice Parameter for General Radiography.

IV. SPECIFICATIONS OF THE EXAMINATION

The written or electronic request for a barium small bowel examination should provide sufficient information to demonstrate the medical necessity of the examination and allow for its proper performance and interpretation.

Documentation that satisfies medical necessity includes 1) signs and symptoms and/or 2) relevant history (including known diagnoses). Additional information regarding the specific reason for the examination or a provisional diagnosis is helpful and may at times be needed to allow for the proper performance and interpretation of the examination.

The request for the examination must be originated by a physician or other appropriately licensed health care provider. The accompanying clinical information should be provided by a physician or other appropriately licensed health care provider familiar with the patient's clinical problem or question and consistent with the state scope of practice requirements. (ACR Resolution 35, adopted in 2006)

A. Patient Preparation

The patient should be instructed to refrain from taking anything by mouth after midnight the night before the procedure. Patients may generally take scheduled medications on the morning of the examination. Examinations may be performed with shorter fasting times as clinically indicated. If a peroral pneumocolon is planned, a bowel preparation to remove any intraluminal particulate material should be performed [1].

B. Examination Preliminaries

An appropriate medical history should be available**,** including results of laboratory tests and prior imaging, endoscopic, and surgical procedures as applicable.

C. Examination Technique

The physician should tailor the barium small bowel examination procedure to the individual patient, as warranted by clinical circumstances and the condition of the patient, to produce a diagnostic quality examination.

1. The procedure should include:
   a. Oral ingestion of a minimum of 16 ounces of a well-suspended barium preparation, with additional barium ingestion as needed to maintain uniform distension of all barium-opacified small bowel loops. This is best accomplished by maintaining a barium-filled stomach for the duration of the procedure. Because of dilution and absorption, the use of water-soluble contrast media is not the preferred method for small bowel contrast examination and imaging. However, water-soluble contrast is sometimes preferred by referring physicians if there is suspicion of bowel leak or obstruction.
   b. Fluoroscopy with compression of all accessible small bowel loops, including the terminal ileum, with appropriate images to demonstrate any abnormality**.**
   c. After obtaining preliminary images of the abdomen, serial large-format overhead images of the abdomen are obtained in the prone position**,** when possible, each labeled with the individual time of acquisition. These overhead images are obtained as the ingested barium progresses through the small bowel to the colon and allow documentation of transit time.
   d. If peroral pneumocolon is needed to better visualize the terminal ileum, the patient is then placed in the lateral decubitus position on the fluoroscopy table. Pneumocolon is achieved by introducing a flexible enema catheter tip connected to a hand-held bulb insufflator into the rectum and insufflating room air.

Gas is introduced in a retrograde manner under intermittent fluoroscopic guidance. The patient can be placed in prone position to encourage reflux of gas into the terminal ileum [9].

2. Techniques specific to this examination are:
   a. Use of a large volume of an appropriate barium suspension.
   b. Compression and spot imaging of all accessible small bowel loops.
   c. Image exposure sufficient to penetrate filled segments of the small bowel.
   d. Use of special maneuvers to attempt to visualize small bowel loops in the pelvis.

3. The following quality control indicators should be applied to all barium small bowel examinations:
   a. When examinations are completed, patients should be held in the fluoroscopic area until the physician has reviewed all images.
   b. An attempt should be made to resolve questionable radiographic findings before the patient leaves. Repeat fluoroscopy of segments in question or special maneuvers, such as per oral pneumocolon, should be performed as necessary.

V. DOCUMENTATION

Reporting should be in accordance with the ACR Practice Parameter for Communication of Diagnostic Imaging Findings.

VI. EQUIPMENT SPECIFICATIONS

Examinations should be performed with fluoroscopic image intensification and radiographic equipment meeting all applicable federal and state radiation standards.

Equipment should provide diagnostic fluoroscopic image quality and recording (radiograph, video, or digital) capability. The equipment should be able to produce kilovoltage greater than 100 kVp. Equipment necessary to compress and isolate accessible regions of the small bowel should be readily available.

VII. RADIATION SAFETY IN IMAGING

Radiologists, medical physicists, registered radiologist assistants, radiologic technologists, and all supervising physicians have a responsibility for safety in the workplace by keeping radiation exposure to staff, and to society as a whole, "as low as reasonably achievable" (ALARA) and to assure that radiation doses to individual patients are appropriate, taking into account the possible risk from radiation exposure and the diagnostic image quality necessary to achieve the clinical objective. All personnel that work with ionizing radiation must understand the key principles of occupational and public radiation protection (justification, optimization of protection and application of dose limits) and the principles of proper management of radiation dose to patients (justification, optimization and the use of dose reference levels) http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1578_web-57265295.pdf

Nationally developed guidelines, such as the ACR's Appropriateness Criteria®, should be used to help choose the most appropriate imaging procedures to prevent unwarranted radiation exposure.

Facilities should have and adhere to policies and procedures that require varying ionizing radiation examination protocols (plain radiography, fluoroscopy, interventional radiology, CT) to take into account patient body habitus (such as patient dimensions, weight, or body mass index) to optimize the relationship between minimal radiation dose and adequate image quality. Automated dose reduction technologies available on imaging equipment should be used whenever appropriate. If such technology is not available, appropriate manual techniques should be used.

Additional information regarding patient radiation safety in imaging is available at the Image Gently® for children (www.imagegently.org) and Image Wisely® for adults (www.imagewisely.org) websites. These advocacy and

awareness campaigns provide free educational materials for all stakeholders involved in imaging (patients, technologists, referring providers, medical physicists, and radiologists).

Radiation exposures or other dose indices should be measured and patient radiation dose estimated for representative examinations and types of patients by a Qualified Medical Physicist in accordance with the applicable ACR technical standards. Regular auditing of patient dose indices should be performed by comparing the facility's dose information with national benchmarks, such as the ACR Dose Index Registry, the NCRP Report No. 172, Reference Levels and Achievable Doses in Medical and Dental Imaging: Recommendations for the United States or the Conference of Radiation Control Program Director's National Evaluation of X-ray Trends. (ACR Resolution 17 adopted in 2006 – revised in 2009, 2013, Resolution 52).

VIII. QUALITY CONTROL AND IMPROVEMENT, SAFETY, INFECTION CONTROL, AND PATIENT EDUCATION

Policies and procedures related to quality, patient education, infection control, and safety should be developed and implemented in accordance with the ACR Policy on Quality Control and Improvement, Safety, Infection Control, and Patient Education appearing under the heading *Position Statement on QC & Improvement, Safety, Infection Control, and Patient Education* on the ACR website (http://www.acr.org/guidelines).

Equipment performance monitoring should be in accordance with the ACR–AAPM Technical Standard for Diagnostic Medical Physics Performance Monitoring of Fluoroscopic Equipment and the ACR–AAPM Technical Standard for Diagnostic Medical Physics Performance Monitoring of Radiographic Equipment.

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