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The American College of Radiology will periodically define new practice parameters and technical standards for radiologic practice to help advance the science of radiology and to improve the quality of service to patients throughout the United States. Existing practice parameters and technical standards will be reviewed for revision or renewal, as appropriate, on their fifth anniversary or sooner, if indicated.

Each practice parameter and technical standard, representing a policy statement by the College, has undergone a thorough consensus process in which it has been subjected to extensive review and approval. The practice parameters and technical standards recognize that the safe and effective use of diagnostic and therapeutic radiology requires specific training, skills, and techniques, as described in each document. Reproduction or modification of the published practice parameter and technical standard by those entities not providing these services is not authorized.

Amended 2014 (Resolution 39)\*

## **ACR–SPR PRACTICE PARAMETER FOR GENERAL RADIOGRAPHY**

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### **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<sup>1</sup>. 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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<sup>1</sup> *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

This practice parameter was revised collaboratively by the American College of Radiology (ACR) and the Society for Pediatric Radiology (SPR).

Radiography is a proven and useful modality that uses differences in X-ray attenuation to evaluate human anatomy and pathology. The goal is to establish the presence or absence and nature of disease by demonstrating normal anatomy or the effects of the disease process on anatomical structures. The study should be performed with the minimal radiation dose necessary to achieve a diagnostic study.

This practice parameter applies only to radiologists performing general radiography. If an ACR practice parameter or technical standard exists for a specific type of radiographic examination being performed, that practice parameter or technical standard may identify additional physician requirements for nonradiologists based on the specifics of the examination.

For pediatric considerations see section IV.8.

## II. INDICATIONS AND CONTRAINDICATIONS

There are many indications for radiography that relate to the patient's clinical history, the disease processes, and the anatomic areas of concern. There should be a sufficient clinical indication to warrant performance of a study, and a reasonable anticipation that the results of the radiograph, normal or abnormal, will influence the treatment course of the patient. The indications should be communicated to the facility and the physician responsible for performing and interpreting the radiographic study. The ACR Appropriateness Criteria<sup>®</sup> should be considered when choosing the appropriate imaging procedure for the clinical situation.

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](#) [1].

## III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

### A. Physician

1. Images must be obtained under the supervision of, and interpreted by, a licensed physician with the following qualifications:
  - a. Certification in Radiology or Diagnostic Radiology by the American Board of Radiology, the American Osteopathic Board of Radiology, the Royal College of Physicians and Surgeons of Canada, or the Collège des Médecins du Québec.
  - or
  - b. Completion of a diagnostic radiology residency program approved by the Accreditation Council for Graduate Medical Education (ACGME), the Royal College of Physicians and Surgeons of Canada (RCPSC), the Collège des Médecins du Québec, or the American Osteopathic Association (AOA) to include radiographic training on all body areas and documentation of a minimum of 6 months of formal dedicated training in the interpretation and formal reporting of general imaging, for patients of all ages.
- and
2. The physician should have documented training in and understanding of the physics of diagnostic radiography and experience with the equipment needed to safely produce the images.
- and
3. The physician must be familiar with the principles of radiation protection, the hazards of radiation, and radiation monitoring requirements.
- and
4. The physician must have documented training and understanding of other medical imaging modalities (fluoroscopy, computed tomography, ultrasound, magnetic resonance imaging, nuclear medicine, etc.).

and their value relative to general radiography in order to determine the best imaging examination to evaluate the patient's clinical symptoms.

#### Maintenance of Competence

All physicians performing general radiography examinations should demonstrate evidence of continuing competence in the interpretation and reporting of those examinations.

#### Continuing Medical Education

The physician's continuing medical education should be in accordance with the [ACR Practice Parameter for Continuing Medical Education \(CME\)](#) [2] and should include CME in general radiography as is appropriate to his/her practice.

#### B. Qualified Medical Physicist

A Qualified Medical Physicist is an individual who is competent to practice independently one or more of the subfields in medical physics. The American College of Radiology considers certification and continuing education and experience in the appropriate subfield(s) to demonstrate that an individual is competent to practice one or more of the subfields in medical physics, and to be a Qualified Medical Physicist. The ACR strongly recommends that the individual be certified in the appropriate subfield(s) by the American Board of Radiology (ABR), the Canadian College of Physics in Medicine, or by the American Board of Medical Physics (ABMP).

A Qualified Medical Physicist should meet the [ACR Practice Parameter for Continuing Medical Education \(CME\)](#). (ACR Resolution 17, 1996 – Revised 2012, Resolution 42) [2]

The appropriate subfields of medical physics for this parameter are Therapeutic Medical Physics and Diagnostic Medical Physics. (Previous medical physics certification categories including Radiological Physics, Therapeutic Radiological Physics, Diagnostic Radiological Physics, and Diagnostic Imaging Physics are also acceptable.)

#### C. Registered Radiologist Assistant

A registered radiologist assistant is an advanced level radiographer who is certified and registered as a radiologist assistant by the American Registry of Radiologic Technologists (ARRT) after having successfully completed an advanced academic program encompassing an ACR/ASRT (American Society of Radiologic Technologists) radiologist assistant curriculum and a radiologist-directed clinical preceptorship. Under radiologist supervision, the radiologist assistant may perform patient assessment, patient management and selected examinations as delineated in the Joint Policy Statement of the ACR and the ASRT titled "Radiologist Assistant: Roles and Responsibilities" and as allowed by state law. The radiologist assistant transmits to the supervising radiologists those observations that have a bearing on diagnosis. Performance of diagnostic interpretations remains outside the scope of practice of the radiologist assistant. (ACR Resolution 34, adopted in 2006) [3]

#### D. Radiologic Technologist

Certification by the American Registry of Radiologic Technologists (ARRT) or an unrestricted state license is required.

### IV. SPECIFICATIONS OF THE EXAMINATION

The written or electronic request for general radiography 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 would be 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)

#### Technique

1. All images should be labeled with the following information: a) patient identification, b) facility identification, c) examination date and time, and d) the side (right or left) of the anatomic site imaged.
2. All facilities performing radiography should have protocols for the standard view or views of each anatomic area of interest. These should be designed to optimize diagnostic information while minimizing radiation exposure.
3. Appropriate collimation should be used to limit exposure to the anatomic area of interest.
4. All facilities performing radiography should have technique charts, or protocols in generator memory, for all anatomic parts, listing exposure factors that will reliably produce diagnostic-quality images of patients of different sizes, to minimize the need for repeat exposures. Repeat rates should be part of the routine quality control process.
5. Whenever feasible, images should be reviewed for diagnostic quality before the patient is released. Repeat imaging should be performed as appropriate, when necessary for diagnostic quality.
6. All facilities producing images should have policies and procedures for appropriate shielding of patients.
7. Appropriate immobilization and assistance procedures should be available to ensure that images of diagnostic quality can be obtained in patients who are unable to cooperate or unable to be positioned in the usual manner due to age or physical limitations, while avoiding unnecessary irradiation of health care workers.
8. For pediatric patients, specific efforts should be made to reduce radiation dose, when diagnostically feasible.
  - a. Technique charts should be tailored for the infant, toddler, preadolescent child, and adolescent (small and large) child.
  - b. A grid should not be used for radiographic examinations of body parts less than 12 cm in thickness.
  - c. For the larger adolescent child, technique parameters should be similar to those for adult patients.
  - d. Gonadal shielding should be used when appropriate as per department protocol.

## V. DOCUMENTATION

Reporting should be in accordance with the [ACR Practice Parameter for Communication of Diagnostic Imaging Findings](#) [4].

## VI. EQUIPMENT SPECIFICATIONS

A. The diagnostic radiographic equipment and facility should meet all applicable federal and state radiation standards.

B. Where an analog film system is used, appropriate screen-film and grid combinations should be available to obtain diagnostic images of all anatomic areas to be imaged.

C. Where digital imaging is used, the equipment should meet the specifications described in the [ACR–AAPM–SIIM Technical Standard for the Electronic Practice of Medical Imaging](#) [5] and the [ACR–AAPM–SIIM Practice Parameter for Digital Radiography](#) [6].

## **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](http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1578_web-57265295.pdf).

Nationally developed guidelines, such as the ACR’s Appropriateness Criteria<sup>®</sup>, 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<sup>®</sup> for children ([www.imagegently.org](http://www.imagegently.org)) and Image Wisely<sup>®</sup> for adults ([www.imagewisely.org](http://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 Technical Standard for Diagnostic Medical Physics Performance Monitoring of Radiographic and Fluoroscopic Equipment](#) [7]. A quality monitoring mechanism should be in place for tracking, recording, and evaluating errors in technique.

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\*Practice parameters and technical standards are published annually with an effective date of October 1 in the year in which amended, revised, or approved by the ACR Council. For practice parameters and technical standards published before 1999, the effective date was January 1 following the year in which the practice parameter or technical standard was amended, revised, or approved by the ACR Council.

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