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ACR–SIR–SNIS–SPR PRACTICE PARAMETER FOR THE CLINICAL PRACTICE OF INTERVENTIONAL RADIOLOGY

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 care¹. 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 considering 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 variables such as the condition of the patient, limitations of available resources, or advances in knowledge or technology after publication of this document. However, a practitioner who employs an approach substantially different from the guidance in this document may consider documenting in the patient record information sufficient to explain the approach taken.

The practice of medicine involves the science, and 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 purpose of this document is to assist practitioners in achieving this objective.

¹ *Iowa Medical Society and Iowa Society of Anesthesiologists v. Iowa Board of Nursing* 831 N.W.2d 826 (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.

INTRODUCTION

This practice parameter has been developed, written, and revised collaboratively by the American College of Radiology (ACR), the Society of Interventional Radiology (SIR), the Society of NeuroInterventional Surgery (SNIS), and the Society for Pediatric Radiology (SPR).

Interventional radiology is a medical specialty that focuses on diagnosis, treatment, and clinical management of patients using minimally invasive procedures guided by medical imaging. This document identifies the common elements that define the clinical practice of “interventional radiologists,” inclusive of related subspecialties, such as pediatric interventional radiology, interventional oncology, and interventional neuroradiology.

An interventional radiologist interacts directly with patients, evaluating and counseling them regarding their diseases and therapeutic options. Interventional therapy includes initial consultation, patient assessment, image-guided therapeutic interventions when appropriate and continues through time to eventual resolution of the clinical problem or establishment of an alternative care plan. To achieve these ends, it is necessary for the interventional radiologist to see patients in a clinical practice setting in order to formulate and execute management plans. A clinical office space and privileges to manage patients in the hospital are essential.

In addition to the mandatory infrastructure requirements, there are benchmarks that define an interventional clinical practice. These benchmarks should be used as goals for developing the practice. An interventional radiologist should be able to:

- Accept referrals for evaluation and therapeutic interventions as the sole or primary consultant for the disease process.
- Perform consultations prior to and following elective, urgent, or emergent interventions with a system to communicate these consultations to the referring providers.
- Inform patients referred for diagnostic imaging services and their referring providers about the spectrum of therapeutic options that might benefit them and provide interventional treatment if the patient desires.
- Establish, document, and implement treatment plans as medically indicated.
- Admit patients as needed.
- Provide longitudinal patient care as appropriate.
- Submit accurate claims and have the necessary billing support system.

The following practice parameters should be used to develop an interventional clinical practice for both inpatient and outpatient clinical services [1-3]. Recommendations will include requirements concerning processes for handling referrals, physician-patient relationship, scheduling of invasive procedures, staffing, clinic space, time dedicated to clinical duties, equipment needs, clerical services, and continuous quality improvement programs.

II. THE CLINICAL TEAM

A. Interventional Radiologist

The interventional radiologist has the primary clinical responsibility as head of the team. The interventional radiologist should be dedicated to the clinical management of patients and the performance of interventional procedures.

B. Advanced Practice Provider

Advanced practice providers (APPs) can help improve the efficiency of the clinical practice, and their training makes them valuable members of the interventional clinical team [4-7].

Medicare and most other third-party payers allow APPs to bill under their own identification numbers for the clinical services they provide. The APPs can perform various interventional procedures, thereby increasing the productivity of the interventional clinical team. They should be trained and credentialed for the procedures they perform and their clinical activities.

Although physician assistants (PAs) and nurse practitioners (NPs) can function in a similar, if not identical manner, there are clear differences in the way they can practice as viewed or determined by the Centers for Medicare & Medicaid Services (CMS), regulatory agencies, and local hospitals. Interventional radiologists are advised to consult with their local regulatory agencies and hospitals regarding the modes of practice that are acceptable in their regions.

C. Non-Physician Radiology Provider (NPRP)

NPRPs are all Non-Physician Providers (eg, RRA, RPA, RA, PA, NP, ...) who assist with or participate in portions of the practice of a radiologist-led team (Radiologists = diagnostic, interventional, neurointerventional radiologists, radiation oncologists, and nuclear medicine physicians). The term “NPRP” does not include radiology, CT, US, NM MRI technologists, or radiation therapists who have specific training for radiology related tasks (eg, acquisition of images, operation of imaging and therapeutic equipment) that are not typically performed by radiologists.

The term 'radiologist-led team' is defined as a team supervised by a radiologist (ie, diagnostic, interventional, neurointerventional radiologist, radiation oncologist, and nuclear medicine physician) and consists of additional healthcare providers including RRAs, PAs, NPs, and other personnel critical to the provision of the highest quality of healthcare to patients. (ACR Resolution 8, adopted 2020).

D. Nursing

Registered nurses (RNs) play a critical role providing clinical evaluation and can be used to augment clinical services. RNs can obtain vital signs, perform routine screening, review medications and allergies, and obtain “review of systems” during clinical evaluation. They can provide education to patients about procedures, management of catheters at home, and postprocedure instructions. RNs are also involved in administering medications during procedural sedation and interventional procedures. They are often the independent observers for monitoring patients during procedural sedation. For further information on sedation, see the [ACR–SIR Practice Parameter for Sedation/Analgesia](#) [8].

The addition of a nurse coordinator to a clinical interventional team should be considered when there is a need to provide care adjunctive to that provided by the practitioner. Examples include, but are not limited to, gathering laboratory values, speaking with family members, and organizing referrals to other clinical services. In the outpatient setting, adjunctive care might include drawing blood, providing patient education, assisting with scheduling, and telephone consultation and follow-up with patients. Nurse coordinators are particularly helpful in assisting in screening or triaging referrals or assisting with research protocols.

E. Radiologic Technologist

A radiologic technologist plays a critical role during interventional procedures. The radiologic technologist should be certified by the ARRT or have an unrestricted state license by the relevant authorities in their jurisdiction or country, with documented training and experience in interventional procedures. It is desirable for the technologist to have special certification in cardiac-interventional (CI) and/or vascular interventional (VI) radiography procedures (eg, RT [R] [CV]).

F. Certified Medical Assistant

The medical assistant plays a valuable role in a robust clinical practice. Within an outpatient clinic setting, the medical assistant facilitates patient flow and operational efficiency. A medical assistant can be tasked to prepare an examination room, chaperone patients throughout a large physical area (moving to and from rooms, blood draw areas, and imaging centers), acquire vital signs, and perform basic charting. The medical assistant contributes to efficient use of resources, performing activities that do not require higher levels of training possessed by the nurse, APP, or physician.

III. ADMINISTRATIVE SERVICES

The required administrative personnel needed to run an office-based clinical practice ideally include a receptionist, an office manager, a scheduler, an individual to perform insurance precertification, personnel with knowledge of coding guidelines with experience and expertise in interventional coding and claims submission, and a compliance officer. In addition, personnel to perform data management and quality improvement are important. Individual staff members may perform more than one function.

The following elements are necessary to implement an effective quality program:

- Resources to track procedures, outcome and quality data, and long-term follow-up
- Regular analysis of quality data and implementation of quality improvement actions

The following elements are highly desirable and contribute to quality control/continuous quality improvement:

- Participation in national databases or registries (which may become necessary for reimbursement and facility accreditation for some services)
- Participation in structured reporting

An individual may fulfill the responsibilities of more than one position. Many of these administrative services are already available in a clinic and could be expanded or modified to meet the additional needs.

IV. THE OUTPATIENT PRACTICE

The outpatient interventional clinic should be the cornerstone of any interventional clinical practice and serves as the “front door” through which most patients enter the practice. The outpatient clinic is essential for provision of longitudinal care, including monitoring and surveillance of disease progression or recurrence. Many patients may require follow-up interventional or diagnostic studies. Longitudinal care is vital to the growth and future success of interventional practices and to the patient’s well-being.

In the outpatient clinic setting, the interventional radiologist and support staff can perform the following duties while providing evaluation and management (E&M) services:

- Determining appropriate diagnostic workup
- Determining the need for and arranging consultation with other physicians
- Scheduling interventional procedures
- Obtaining insurance authorization for care
- Providing follow-up care, including postprocedure testing
- Providing counseling to patients and families

A. Space and Equipment

A successful interventional clinic practice requires a dedicated clinic space. The interventional clinic is best designed as a conventional doctor’s office, with a waiting room, a receptionist, and a private and confidential examination room. This can be achieved using an office-sharing arrangement within a hospital-owned clinic or within another specialty clinic (eg, a surgical or internal medicine clinic).

There are many advantages to establishing an office practice outside the hospital (such as in a medical office building) or in a dedicated outpatient center within the hospital. They include patient comfort and privacy and an increased understanding by the referring doctors of the practice’s level of commitment to longitudinal patient care. Specifically, trying to perform routine clinical consultation in a holding/recovery area or in an interventional suite is not appropriate.

The examination room(s) should be large enough to accommodate an examination table, a sink, chairs, and be wheelchair accessible. Equipment requirements for the examination room(s)/clinic should include the following:

- Examination table
- Sphygmomanometer

- Stethoscope
- Educational material
- Desk
- Phone/intercom access for communication
- Emergency access bell/pull/alarm available at floor level
- Other devices as required by different subspecialties

Other office requirements include the following:

- Space for storing medical equipment and medical records
- Dictation/transcription capabilities
- Facilities for viewing imaging and clinical information
- Restroom facilities

A patient education room is an optional feature.

Additional equipment (such as a vein light, portable ultrasound machine, or portable Doppler) may be required to perform thorough examinations.

B. Personnel

Whether in an office-sharing arrangement or in a freestanding interventional clinic, certain personnel may be required:

- Receptionist
- Scheduler
- Clerical support
- APPs, RN, or both
- Practice manager
- Coding and billing personnel
- Interventional radiologist

A single individual may fulfill the responsibilities of more than one position. A receptionist, for example, may provide typing/dictation service, and also manage medical records.

C. Time

Interventional clinics should ideally be staffed with providers dedicated to seeing patients and not scheduled to perform procedures concurrently. The weekly provider time recommended for new patient evaluations and established patient follow-up visits is at least 10% to 30% of the total weekly time dedicated to the interventional radiology practice. The exact percentage of time required will vary depending on the size and case mix of the practice. Practice parameters for time (including both physician and ancillary personnel time) allotted per clinic patient can vary widely depending on the complexity of the medical problem, but are usually in the range of 30 to 60 minutes for a new patient visit and 15 to 30 minutes for a follow-up patient visit.

D. Communication of Clinical Care

A written consultation report detailing each patient's clinical evaluation and treatment plan must be sent to the referring physician (and the clinical care team if necessary) in a timely fashion. The consultation should be filed and electronically signed within the patient's electronic medical record (EMR). In addition, documentation of any postoperative care should be forwarded to the referring physician as well as to any other physician who may have an interest in the ongoing care of the patient.

V. THE INPATIENT PRACTICE

A. Inpatient Service

The ability to obtain hospital admitting privileges is critical for a clinical interventional practice. It demonstrates that the interventional radiologist is willing and able to take the primary responsibility while the patient is in the hospital. This will also facilitate direct referrals to the interventional radiologist. In circumstances wherein hospitalists or specific physicians (such as pediatricians or critical care physicians) are available, the interventional radiologist might choose to work in conjunction with these providers.

The interventional radiology inpatient service allows management of patients during and after an interventional procedure. Patients are admitted at the discretion of the interventional radiologist.

The number of physicians in the group who provide interventional services and have admitting privileges should be sufficient to provide 24-hour interventional call coverage. This includes managing the clinical problems that fall within the interventional radiologist's scope of practice as well as consulting other specialties as necessary.

Part of the duties of the inpatient service include daily clinical rounds, discharging inpatients admitted to the interventional radiology inpatient service, and arranging follow-up. The inpatients to be seen should include the following:

- Any patient who is admitted by the interventional practice
- Patients with a significant portion of his or her inpatient care managed by the interventional service.
- Any patient with a clinical problem that is being managed by the interventional practice in consultation

B. Time Allocation

The time allocation for inpatient clinical duties includes the total time spent by the physician, APP, and any other ancillary staff that the interventional radiologist deems appropriate. The exact amount of time required for daily rounds and admissions will depend on the size of the practice and case mix.

C. Scheduling of Interventional Procedures

While it may be acceptable to schedule some invasive diagnostic radiology procedures, such as a superficial biopsy or arthrography, based on a direct request from a physician's office, many interventional procedures should be referred for patient consultation with the interventional radiologist prior to the procedure. The interventional radiologist will examine the patient; formulate a care plan; determine the appropriateness of a requested procedure (if specifically requested); discuss the risks, benefits, and alternatives to the procedure; obtain informed consent; and arrange for scheduling of the procedure.

VI. IMAGING REQUIREMENTS

Radiology departments must continue to take the lead in providing state-of-the-art imaging. Patients who may benefit from an interventional procedure are often seen first in the radiology department for imaging studies. These patients should be identified and the information promptly conveyed to the referring physician(s). This will help to optimize the use of interventional procedures in clinical practice. If the diagnostic radiologist interpreting the study is not familiar with the indications for a specific interventional procedure, he or she may consult with an interventional radiologist.

Quality control mechanisms that track the imaging of potential interventional patients to guarantee that the imaging is performed with high quality and with a high level of service may be helpful in promoting interventional procedures. These goals are best accomplished in most radiology departments using a team approach. The critical points in the program include the following:

- Maintaining high-quality image interpretation. In many departments, this may require involvement of the interventional radiologist in either a primary reading role or a support role
- Identifying patients who may benefit from interventional procedures

- Communicating knowledgeably about potential interventions to the referring physician
- Educating potential referring physicians on the role of the interventional radiologist in the evaluation and management (E&M) of those patients who are found to have treatable disease at the time of imaging. At times, this will be best accomplished by having the interventional radiologist directly communicate with the referring physician.
- Providing the time necessary for the interventional radiologist to participate in such a program

These collaborative measures are in the interest of patient care and in the interest of the future growth of interventional radiology.

VII. INTERVENTIONAL SUITE REQUIREMENTS

This section summarizes the equipment required to operate a clinical interventional practice. This equipment needs to be located in a setting that provides the electrical service, air conditioning, air exchange, sterile conditions, room and task lighting, telephone, computer, and patient amenities required for these types of procedures. The setting may be within a hospital or outpatient facility. The interventional suite must be of sufficient size to hold the imaging and nonradiographic equipment, provide easy access to the patient from multiple approaches, and accommodate the necessary life-support equipment. Interventional procedures may be performed in other parts of the Radiology Department, such as computed tomography (CT), ultrasound (US), and magnetic resonance imaging (MRI).

A. Radiographic Equipment

Fixed-installation fluoroscopy equipment designed and specified for interventional procedures is preferable [9,10]. The equipment parameters should be sufficient to perform interventional procedures. Some of these parameters include the following:

- Appropriately sized image receptor
- Permanent recording modes (eg, digital subtraction angiography (DSA), cine)
- Fluoroscopic tube focal spot(s), output, heat load, and cooling capacity
- Generator capacity
- Software packages
- Local modality image storage capacity
- DICOM capability—ability to integrate with PACS
- Procedure-appropriate radiation dose-management tools
- Patient table weight limits

Biplane imaging and 3-D angiography are strongly recommended for the interventional neuroradiology practice. Cone-beam CT capability is very useful for interventional radiology and interventional neuroradiology procedures. Depending on patient size and user preference, large-bore CT scanners with CT fluoroscopy may be recommended for CT-guided interventions. Ultrasound equipment with high-quality near-field imaging and penetration is a critical component of most interventional practices.

B. Patient Preparation Area and Recovery Room

Dedicated space should be allocated to hold inpatients and outpatients who are awaiting procedures or transport, to observe patients prior to transfer to the wards, and for recovery of outpatients. The amount of space should be appropriate to the clinical practice and may require up to four beds per interventional suite. This could include space in a dedicated recovery area, not necessarily in the radiology department. This space requires oxygen, suction, physiologic monitoring capability, a telephone, computer (or mobile device), and ready access to resuscitation equipment, as well as call button/emergency access/alarm capability at floor level. An efficient preprocedure and recovery area is important for a high-volume practice.

C. Medical/Surgical Supply Inventory

The dedicated interventional suite must have sufficient storage for commonly used equipment, as well as an inventory control system. This space should be located close to the suite.

The following items relevant to inventory should be considered when developing an interventional practice suite:

- Sufficient budgetary commitment to sustain the supply and disposable equipment needs of the suite
- Dedicated personnel responsible for inventory management
- An inventory control system, ideally with barcode-reading capability

D. Nonradiographic Equipment

The modern interventional suite often requires other invasive and noninvasive equipment for nonradiographic imaging and interventions. The following list of such essential equipment is intended to serve as a guide:

- Oxygen and suction
- Physiologic monitors
- Resuscitation equipment
- Image-viewing facilities
- Readily accessible secure storage for drugs, including those that require refrigerated storage
- Communication equipment (eg, telephone, mobile devices)
- Ceiling-mounted or mobile operating room light
- For programs that provide pediatric interventions, equipment and supplies appropriately sized and configured for procedures in children [2]

E. Staffing

Staffing levels should be sufficient to provide at least one qualified individual to monitor the patient in each procedure. Staff providing sedation should be appropriately trained and credentialed. The recovery area should be appropriately staffed with nurses and/or APPs so as to care for patients recovering from moderate sedation, as well as patients that may require higher nurse-to-patient ratios, such as critically ill patients and pediatric patients.

Radiologic technologist staffing levels should be sufficient to provide one to two technologists per procedure room. The technologist will assist with the case, perform imaging functions, inventory, cleanup, room preparation, image or digital image processing, and data entry.

To achieve consistent coverage, the above staffing recommendations should be considered in light of local staffing factors. This will require greater than one full-time equivalent (FTE) per procedure room to cover vacations, sick time, and educational leave and can vary from 1.2 to approximately 1.8 FTEs per staff position depending on the benefit levels and number of shifts per day.

F. Physiological Monitoring Equipment

The interventional suite must be capable of monitoring critically ill patients and patients under moderate sedation and/or general anesthesia. The ability to monitor blood pressure, heart rate, electrocardiogram (ECG), and pulse oximetry and to perform invasive pressure measurements must be available at a minimum. Capnography is essential. Direct transmittal of intraprocedural physiological monitoring data to the EMR is ideal. Alternatively, a paper printer should be available to produce a permanent hardcopy of any selected physiological parameter. In addition, point-of-care testing facilities to obtain desirable laboratory tests (such as activated clotting time, serum creatinine, serum potassium, etc) improve efficiency of patient care.

VIII. PRACTICE DEVELOPMENT

The preservation and development of an interventional radiology-based clinical office practice has unique challenges and requires regular attention with a multifaceted approach. The goal is to inform referring physicians

and the public of the services offered and to provide reliable service with a reputation for availability and consistency [11,12].

A. Communications

Written communication is the primary means by which a clinical practice interacts with its referring community. Letters should have a letterhead that reflects the practice's interventional radiology focus. Letters should not resemble imaging reports. Copies of letters should be sent to all doctors important in the care of the patient and should always include the primary care doctor when he or she is not the referring doctor. In practices that use electronic communications, this correspondence can be provided electronically.

B. Website

The letterhead and any brochure of the interventional practice should ideally provide a website address through which referring physicians and the public can find details about the interventional physicians and the services provided by the practice as well as reliable location and contact information. Social media has taken on increasing importance in connecting patients and referring physicians, and this avenue starts with a robust website. Search engine optimization (SEO) has developed as a useful tool to ensure high visibility of an interventional practice on a local, regional, and national level. With a visually appealing and highly informative website as a base, interventionists can promote visibility in the community.

C. Personal Contact

An analysis of key imaging referrals through the larger radiology practice can lead to identification of physicians or physician groups to whom direct contact should be targeted with personal phone calls, visits, and educational forums. This type of targeted, personal, and repeated attention will not only allow expansion of interventional services but will also build long-term relationships.

D. Education

Active attendance and participation in multidisciplinary conferences within the hospital are important signals of commitment and availability. Ongoing interaction with potential referring doctors can also be accomplished through grand rounds on topics for which interventional services are available and sponsorship or cosponsorship of educational symposia by local, regional, or national interventionists. Availability should be made of patient-oriented educational brochures covering routinely treated diseases for referring physicians to distribute to their patients. These brochures should be informative and present interventional services in a balanced way and should also be available in the interventional waiting room.

E. Practice Promotion

Public education through radio, television, local newspapers, and magazines with announcements of new physicians, new procedures, and new research is an important supplement to mailing such notification directly to physicians and APPs, medical directors of practices, and practice managers. Emphasizing board certifications, specialty training, and other unique achievements is also important. In larger practices, having individual interventional radiologists and interventional neuroradiologists subspecialize along broad disease categories or service lines may enhance promotion. For example, an interventional radiologist that specializes in uterine fibroid embolization can serve as the primary contact person in that practice for the referring gynecologists. Such an interventionist benefits from increased familiarity with referring physicians and individual patient groups. Similarly, scheduling clinic days around the specific disease entities or service lines will provide continuity for referring physicians.

F. Other Considerations

Whenever possible, a physician's presence and connection solidifies relationships with the referring physician community. In larger hospital settings, this may entail direct contact with a referring physician's office. Best practice outpatient interventional clinics often have physical proximity to a referrer's clinic.

IX. QUALITY IMPROVEMENT AND PRACTICE EVALUATION

Maintaining and improving quality is a cornerstone of all of the practice parameter and technical standard programs of the ACR. This optimizes patient care and is required by The Joint Commission in the hospital setting. Established programs of continual practice evaluation and quality improvement are a requirement of all current interventional practices [13]. Participation in ongoing practice assessment, including ongoing professional practice evaluation (OPPE) and focused ongoing practice evaluation (FPPE) as warranted, is required by The Joint Commission. Practice Quality Improvement (PQI) is an important core competency for successful interventional radiology clinical programs. The PQI initiative is a framework to facilitate improvement of medical care and/or its delivery as an individual, group, or institution. Participating in mortality and morbidity conferences, with review of practice complications or adverse outcomes, are also beneficial to continual practice improvement. In addition, the interventional radiology clinical practice should participate in the ongoing quality metrics as required by the institution, CMS, and other government agencies.

Quality parameters should be set according to the published data and relevant national societal guidelines. This pertains to both the clinical aspects of an interventional practice as well as the technical outcomes of the procedures. Areas of concern or improvement should be identified and addressed. If a problem or area of improvement is identified, actions designed to improve quality should be made, and the actions should be monitored and documented to ensure improvement.

Individual physician outcomes data are also necessary for granting and maintaining physician privileges. Outcomes data are an important means to inform referring physicians of the benefits of referring patients to interventional radiology and interventional neuroradiology practices.

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 (<https://www.acr.org/Advocacy-and-Economics/ACR-Position-Statements/Quality-Control-and-Improvement>).

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

X. RADIATION SAFETY IMAGING

Radiologists, medical physicists, non-physician radiology providers, 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 who work with ionizing radiation must understand the key principles of occupational and public radiation protection (justification, optimization of protection, application of dose constraints and limits) and the principles of proper management of radiation dose to patients (justification, optimization including the use of dose reference levels). https://www-pub.iaea.org/MTCD/Publications/PDF/PUB1775_web.pdf

Facilities and their responsible staff should consult with the radiation safety officer to ensure that there are policies and procedures for the safe handling and administration of radiopharmaceuticals in accordance with ALARA principles. These policies and procedures must comply with all applicable radiation safety regulations and conditions of licensure imposed by the Nuclear Regulatory Commission (NRC) and by applicable state, local,

or other relevant regulatory agencies and accrediting bodies, as appropriate. Quantities of radiopharmaceuticals should be tailored to the individual patient by prescription or protocol, using body habitus or other customized method when such guidance is available.

Nationally developed guidelines, such as the [ACR's Appropriateness Criteria®](#), should be used to help choose the most appropriate imaging procedures to prevent unnecessary radiation exposure.

Additional information regarding patient radiation safety in imaging is available from the following websites – Image Gently® for children (www.imagegently.org) and Image Wisely® for adults (www.imagewisely.org). 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 periodically measured by a Qualified Medical Physicist in accordance with the applicable ACR Technical Standards. Monitoring or regular review of dose indices from patient imaging should be performed by comparing the facility's dose information with national benchmarks, such as the ACR Dose Index Registry and relevant publications relying on its data, applicable ACR Practice Parameters, 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; 2006, 2009, amended 2013, revised 2023 (Res. 2d).

Two personal dosimeters, one worn under the protective apron and a second worn at neck level above protective garments, are preferred and should be used in the fluoroscopically guided-procedure environment. Alternatively, a single personal dosimeter worn at neck level, above protective garments, may be used if it complies with state or local regulations.

These dosimeters should be monitored by the Radiation Safety Officer.

XI. EVALUATION AND MANAGEMENT

A framework for documenting and reporting E&M interactions is a requirement for any successful clinical interventional practice. For all clinical interactions, a robust system of documentation and coding is the first step toward ensuring the clinic is compliant with coding guidelines. Critical aspects of E&M coding include, but are not limited to, the following elements [14]:

- Reimbursement for E&M services require appropriate selection of Current Procedural Terminology® (CPT®) codes that best capture patient type, setting of service, and level of service performed;
- The patient type can be either new or established patients;
- The setting of the E&M service typically falls into the categories of outpatient visits, hospital inpatients, or consultations;
- The level of E&M service is determined by three key components: history, physical examination, and medical decision making;
- Documentation of history and physical examination can be categorized as problem-focused, expanded problem-focused, detailed, or comprehensive services;
- Documentation of medical decision making can be categorized into one of four levels of increasing complexity of care;
- New patients require documentation of all three components, whereas established patient encounters only require two components;
- Documentation of these components can be waived if greater than 50% of the visit was utilized to provide counseling and coordination of care. The total visit time then needs to be documented;
- Federal and state policies guide E&M reimbursement for nurse practitioners and physician assistants.

A facile comprehension of documentation and coding increases the likelihood of being in compliance with coding guidelines and prompt and accurate payer reimbursement for individual visits. By following proper practice parameters, downstream benefits accrue to an interventional clinical practice with an organized system [15].

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