The ASRT Practice Standards for Medical Imaging and Radiation Therapy

Commission Draft – Clean Copy
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Preface

A profession’s practice standards serve as a guide for appropriate practice. The practice standards define the practice and establish general criteria to determine compliance. Practice standards are authoritative statements established by the profession for evaluating the quality of practice, service and education provided by individuals who practice in medical imaging and radiation therapy.

Practice standards can be used by individual facilities to develop job descriptions and practice parameters. Those outside the medical imaging and radiation therapy profession can use the standards as an overview of the role and responsibilities of individuals within the profession.

The medical imaging and radiation therapy professional and any individual who is legally authorized to perform medical imaging must be educationally prepared and clinically competent as a prerequisite to professional practice. The individual should, consistent with all applicable legal requirements and restrictions, exercise individual thought, judgment and discretion in the performance of the procedure. Federal and state statutes, regulations, accreditation standards and institutional policies could dictate practice parameters and may supersede these standards.

Format

The ASRT Practice Standards for Medical Imaging and Radiation Therapy are divided into five sections:

- **Introduction** – provides definitions for the practice and the minimum qualifications for the education and certification of individuals in addition to an overview of the specific practice.
- **Medical Imaging and Radiation Therapy Scope of Practice** – delineates the parameters of the specific practice.
- **Standards** – incorporate patient assessment and management with procedural analysis, performance and evaluation. The standards define the activities of the individual responsible for the care of patients and delivery of medical imaging and radiation therapy procedures; in the technical areas of performance, such as equipment and material assessment safety standards and total quality management; and in the areas of education, interpersonal relationships, self-assessment and ethical behavior.
- **Glossary** – provides definitions of terms used in the practice standards document.
- **Advisory Opinion Statements** – provide interpretations of the standards intended for the clarification and guidance of specific practice issues.

The standards are numbered and followed by a term or set of terms that describes the standards. The next statement is the expected performance of the individual when performing the procedure or treatment. A rationale follows and explains why an individual should adhere to the particular standard of performance.

- **Criteria** – used to evaluate an individual’s performance. Each standard is divided into two parts: the general criteria and the specific criteria. Both should be used when evaluating performance.
• General Criteria – written in a style that applies to medical imaging and radiation therapy professionals and should be used for the appropriate area of practice.
• Specific Criteria – meet the needs of the individuals in the various areas of professional performance. While many areas of performance within medical imaging and radiation therapy are similar, others are not. The specific criteria were developed with these differences in mind.

Within this document, all organizations are referenced by their abbreviation and spelled out within the glossary.
Introduction

Definition

The medical imaging and radiation therapy profession comprises health care professionals identified as a bone density technologist, cardiac interventional and vascular interventional technologist, computed tomography technologist, magnetic resonance technologist, mammographer, medical dosimetrist, nuclear medicine technologist, quality management technologist, radiation therapist, radiographer, radiologist assistant or sonographer who are educationally prepared and clinically competent as identified by these standards.

Furthermore, these standards apply to health care employees who are legally authorized to perform medical imaging and are educationally prepared and clinically competent as identified by these standards.

The complex nature of disease processes involves multiple imaging modalities. Medical imaging and radiation therapy professionals are vital members of a multidisciplinary team that forms a core of highly trained health care professionals who each bring expertise to the area of patient care. They play a critical role in the delivery of health services as new modalities emerge and the need for medical imaging and radiation therapy procedures increases.

Medical imaging and radiation therapy integrates scientific knowledge, technical competence and patient interaction skills to provide safe and accurate procedures with the highest regard to all aspects of patient care. A medical imaging and radiation therapy professional recognizes elements unique to each patient, which is essential for the successful completion of the procedure.

Medical imaging and radiation therapy professionals are the primary liaison between patients, licensed practitioners and other members of the support team. These professionals must remain sensitive to the needs of the patient through good communication, patient assessment, patient monitoring and patient care skills. As members of the health care team, medical imaging and radiation therapy professionals participate in quality improvement processes and continually assess their professional performance.

Medical imaging and radiation therapy professionals think critically and use independent, professional and ethical judgment in all aspects of their work. They engage in continuing education to include their area of practice to enhance patient care, safety, public education, knowledge and technical competence.

Bone Densitometry

The practice of bone densitometry is performed by health care professionals responsible for the administration of ionizing radiation for diagnostic, therapeutic or research purposes. A bone densitometry technologist performs bone densitometry examinations and acquires and analyzes data needed for diagnosis at the request of and for interpretation by a licensed practitioner.

Bone densitometry technologists must demonstrate an understanding of human anatomy, physiology, pathology and medical terminology. They must maintain a high degree of accuracy
in positioning. Bone densitometry technologists must possess, use and maintain knowledge about radiation protection and safety. Bone densitometry technologists independently perform or assist the licensed practitioner in the completion of densitometric procedures.

**Cardiac Interventional and Vascular Interventional Technology**

This practice standards document for cardiac interventional and vascular interventional technology is inclusive of the practice areas of and cardiac interventional and vascular interventional technology.

The practice of cardiac interventional and vascular interventional technology is performed by health care professionals responsible for the administration of ionizing radiation for diagnostic, therapeutic or research purposes. A cardiac interventional and vascular interventional technologist performs radiographic, fluoroscopic and other procedures at the request of and for interpretation by a licensed practitioner. The cardiac interventional and vascular interventional technologist also acquires and analyzes data needed for diagnosis.

The cardiac interventional and vascular interventional technologist must demonstrate an understanding of human anatomy, physiology, pathology and medical terminology. They must maintain a high degree of accuracy in positioning and exposure technique for radiographic and fluoroscopic procedures. Cardiac interventional and vascular interventional technologists must possess, use and maintain knowledge about radiation protection and safety. Cardiac interventional and vascular interventional technologists independently perform or assist the licensed practitioner in the completion of cardiac interventional and vascular interventional technology procedures. Cardiac interventional and vascular interventional technologists prepare, administer and document activities related to medications and radiation exposure in accordance with federal and state laws, regulations or lawful institutional policy.

**Computed Tomography**

The practice of computed tomography is performed by health care professionals responsible for the administration of ionizing radiation for diagnostic, therapeutic or research purposes. A computed tomography technologist performs computed tomography procedures that create the images needed for interpretation and the performance of interventional and therapeutic procedures at the request of and for interpretation by a licensed practitioner.

Computed tomography technologists must demonstrate an understanding of human anatomy, human physiology, pathology and medical terminology. They must maintain a high degree of accuracy in positioning and exposure technique. Computed tomography technologists must possess, use and maintain knowledge about radiation protection and safety. Computed tomography technologists independently perform or assist the licensed practitioner in the completion of computed tomography procedures. Computed tomography technologists prepare, administer and document activities related to medications and radiation exposure in accordance with federal and state laws, regulations or lawful institutional policy.

**Limited X-ray Machine Operator**

The operation of x-ray equipment in a limited scope is performed by health care employees
responsible for the administration of ionizing radiation for diagnostic purposes. A limited x-ray machine operator performs radiographic procedures within the limited scope of practice, producing images at the request of and for interpretation by a licensed practitioner. A limited x-ray machine operator acquires additional images at the request of a licensed practitioner or radiographer.

Limited x-ray machine operators are individuals other than a radiographer who perform static diagnostic radiographic images on selected anatomical sites. They must demonstrate an understanding of human anatomy, physiology, pathology and medical terminology. Limited x-ray machine operators must possess, use and maintain a high degree of accuracy in radiographic positioning and exposure technique. They must possess, apply and maintain knowledge of radiation protection and safety.

Limited x-ray machine operators must remain sensitive to the needs of the patient through good communication, patient monitoring and patient care skills. As members of the health care team, limited x-ray machine operators participate in quality improvement processes and continually assess their performance.

Limited x-ray machine operators think critically and use independent and ethical judgment in all aspects of their work. They engage in ongoing education to include their area of practice to enhance patient care, public education, knowledge and technical competence.

**Magnetic Resonance**

The practice of magnetic resonance is performed by health care professionals responsible for the use of radiofrequencies within a magnetic field for diagnostic, therapeutic or research purposes. A magnetic resonance technologist performs magnetic resonance procedures that create the images needed for diagnosis at the request of and for interpretation by a licensed practitioner.

Magnetic resonance technologists must demonstrate an understanding of human anatomy, human physiology, pathology, pharmacology and medical terminology. They must maintain a high degree of accuracy in positioning and magnetic resonance technique. Magnetic resonance technologists must possess, use and maintain knowledge about magnetic protection and safety. Magnetic resonance technologists independently perform or assist the licensed practitioner in the completion of magnetic resonance procedures. Magnetic resonance technologists prepare, administer and document activities related to medications in accordance with federal and state laws, regulations or lawful institutional policy.

**Mammography**

The practice of mammography is performed by health care professionals responsible for the administration of ionizing radiation and high-frequency sound waves for diagnostic, therapeutic or research purposes. A mammographer performs breast imaging procedures that create mammographic and sonographic images needed for diagnosis at the request of and for interpretation by a licensed practitioner.

Mammographers must demonstrate an understanding of human anatomy, physiology, pathology and medical terminology. They must maintain a high degree of accuracy in positioning.
Mammographers must possess, use and maintain knowledge about radiation protection and safety and biologic effects of high-frequency sound waves. Mammographers prepare, administer and document activities related to medications and radiation exposure in accordance with federal and state laws, regulations or lawful institutional policy.

Mammographers independently perform or assist the licensed practitioner in the completion of mammographic and sonographic breast imaging procedures.

Mammographers must comprehend the complexities of the appropriate federal and state laws, regulations and have knowledge of the quality control and quality assurance requirements for mammography and breast sonography.

**Medical Dosimetry**

The practice of medical dosimetry is performed by health care professionals responsible for designing a treatment plan for use in the administration of ionizing radiation for the purpose of treating diseases, primarily cancer. Medical dosimetrists perform duties and complete responsibilities under the supervision of qualified medical physicists and radiation oncologists. It is typically the medical dosimetrist who generates an optimal treatment plan and ensures the appropriate transfer of data that the radiation therapist will use to treat the patient. The medical dosimetrist maintains a commitment to a high degree of accuracy, thoroughness and safety.

Medical dosimetrists must demonstrate an understanding of anatomy, physiology, pathology and medical terminology. In addition, extensive knowledge of characteristics and clinical relevance of radiation oncology treatment machine and equipment, radiobiology, radiation physics, radiation safety and psychosocial aspects of cancer is required.

Medical dosimetrists must maintain a high degree of accuracy in treatment planning optimization, treatment techniques and positioning. Medical dosimetrists assist the radiation oncologist in localizing the treatment area, generate a treatment plan and actively communicate with the radiation oncology team to enable and ensure the appropriate transfer of information.

Medical dosimetrists are the primary liaison between the radiation therapist, medical physicist and radiation oncologist. Medical dosimetrists must remain sensitive to the physical and emotional needs of the patient through good communication and patient assessment. Radiation therapy often involves daily treatments extending over several weeks using highly sophisticated equipment. It requires thorough initial planning as well as constant patient care and monitoring.

**Nuclear Medicine**

The practice of nuclear medicine and molecular imaging is performed by health care professionals responsible for the administration of ionizing radiation (radioactive material and computed tomography) and nonionizing radiation and adjunctive medications for diagnostic, therapeutic or research purposes. Radioactive materials, medications and imaging and nonimaging equipment are used in nuclear medicine and molecular imaging to study various organs, body systems and samples to aid in the diagnosis, treatment and treatment planning of various pathological conditions. A nuclear medicine technologist performs nuclear medicine and molecular imaging procedures or therapies at the request of and for interpretation by a licensed
practitioner and under the supervision of an authorized user.

Nuclear medicine technologists must demonstrate an understanding of human anatomy and physiology, chemistry, physics and instrumentation, mathematics, medical terminology and pharmacology. Nuclear medicine technologists must maintain a high degree of accuracy in all aspects of the procedure. They must possess, use and maintain knowledge about radiation safety principles. Nuclear medicine technologists independently perform or assist the licensed practitioner and authorized user in the completion of nuclear medicine and molecular imaging procedures and treatments. Nuclear medicine technologists prepare, administer and document activities related to ionizing radiation (radioactive material and computed tomography) and nonionizing radiation, medications and radiation exposure in accordance with federal and state laws, regulations or lawful institutional policy.

**Quality Management**

The practice of quality management is performed by health care professionals responsible for the identification, measurement, control, and improvement of the various core processes that will ultimately lead to improved medical imaging and radiation therapy department performance.

The goal of quality management is to ensure excellence in health care through the systematic collection and evaluation of data, with a primary objective of enhancing patient care.

Today’s medical imaging and radiation therapy departments involve multiple modalities, creating an interdisciplinary team. The quality management technologist is a vital member of the health care team, which includes clinicians, management, support staff and customers.

Quality management includes but is not limited to four main components: quality planning, quality control, quality assurance and quality improvement. Quality management focuses on image/service quality and the means to achieve it. A quality management technologist combines all of these components to ensure efficient and effective patient care.

The quality management technologist must demonstrate an understanding of the various modalities, equipment performance, regulatory/accreditation requirements, performance improvement processes, change management, patient throughput, fiscal implications and the various information technologies present in medical imaging and radiation therapy departments.

Quality management technologists must maintain a high degree of accuracy. They must possess, use and maintain knowledge about radiation protection and safety. Quality management technologists independently perform or assist the medical physicist in the completion of quality control procedures. Quality management technologists prepare, administer and document activities related to all facets of quality management in accordance with federal and state laws, regulations or lawful institutional policy.
Radiation Therapy

The practice of radiation therapy is performed by health care professionals responsible for the administration of ionizing radiation for the purpose of treating diseases, primarily cancer. A radiation therapist performs radiation therapy procedures under the supervision of a radiation oncologist. It is typically the radiation therapist who administers the radiation to the patient throughout the course of treatment.

Radiation therapists must demonstrate an understanding of human anatomy, human physiology, pathology and medical terminology. In addition, comprehension of oncology, radiobiology, radiation physics, radiation oncology techniques, radiation safety and the psychosocial aspects of cancer are required. They must maintain a high degree of accuracy in positioning and treatment techniques. Radiation therapists must possess, use and maintain knowledge about radiation protection and safety. Radiation therapists assist the radiation oncologist to localize the treatment area, participate in treatment planning and deliver high doses of ionizing radiation as prescribed by the radiation oncologist.

Radiation therapists are the primary liaison between patients and other members of the radiation oncology team. They also provide a link to other health care providers, such as social workers and dietitians. Radiation therapists must remain sensitive to the needs of the patient through good communication, patient assessment, patient monitoring, and patient care skills. Radiation therapy often involves daily treatments extending over several weeks using highly sophisticated equipment. It requires thorough initial planning as well as constant patient care and monitoring.

Radiography

The practice of radiography is performed by health care professionals responsible for the administration of ionizing radiation for diagnostic, therapeutic or research purposes. A radiographer performs a full scope of radiographic and fluoroscopic procedures that create the images needed for diagnosis at the request of and for interpretation by a licensed practitioner.

Radiographers must demonstrate an understanding of human anatomy, physiology, pathology and medical terminology.

Radiographers must maintain a high degree of accuracy in radiographic positioning and exposure technique. They must possess, apply and maintain knowledge of radiation protection and safety. Radiographers independently perform or assist the licensed practitioner in the completion of radiographic procedures. Radiographers prepare, administer and document activities related to medications and radiation exposure in accordance with federal and state laws, regulations or lawful institutional policy.

Radiologist Assistant

A radiologist assistant is an advanced-practice radiographer who practices under the supervision of a radiologist and enhances patient care in radiology services. As a member of the radiologist-directed team, the radiologist assistant performs invasive and noninvasive procedures at the request of and for interpretation by a licensed practitioner.
Radiologist assistants act as liaisons between patients, radiographers, radiologists and other members of the health care team. Radiologist assistants remain sensitive to the physical, cultural and emotional needs of patients through good communication, comprehensive patient assessment, continuous patient monitoring and advanced patient care skills.

Radiologist assistants maintain their radiographer credentials; therefore, both the radiologist assistant and radiography sections of the practice standards should be consulted when seeking practice information for the radiologist assistant. The clinical activities are delegated by the supervising radiologist in accordance with state statute or regulations and lawful institutional policies.

**Sonography**

The practice of sonography is performed by health care professionals responsible for the administration of high-frequency sound waves and other diagnostic techniques for diagnostic, therapeutic or research purposes. A sonographer performs sonographic procedures that create the images needed for diagnosis at the request of and for interpretation by a licensed practitioner.

Sonographers must demonstrate an understanding of human anatomy, physiology, pathology and medical terminology.

Sonographers must maintain a high degree of accuracy in the production, use, recognition and analysis of ultrasound images and patterns used for patient diagnosis and treatment. They must possess, use and maintain knowledge about biologic effects of high-frequency sound waves. Sonographers independently perform or assist the licensed practitioner in the completion of sonographic procedures. Sonographers prepare, administer and document activities related to medications in accordance with federal and state laws, regulations or lawful institutional policy.

**Education and Certification**

The individual must be educationally prepared and clinically competent as a prerequisite to professional practice.

Medical imaging and radiation therapy professionals performing multiple modality hybrid imaging should be registered by certification agencies recognized by the ASRT and be educationally prepared and clinically competent in the specific modality(ies) they are responsible to perform. Medical imaging and radiation therapy professionals performing diagnostic procedures in more than one imaging modality will adhere to the general and specific criteria for each area of practice.

To maintain certification(s), medical imaging and radiation therapy professionals must complete appropriate continuing education requirements to sustain their expertise and awareness of changes and advances in practice.

**Bone Densitometry**

Only medical imaging and radiation therapy professionals who have completed the appropriate education and obtained certification(s) as outlined in these standards should perform bone
densitometry procedures.

Bone densitometry technologists prepare for their roles on the interdisciplinary team by successfully completing a program in radiography, nuclear medicine technology or radiation therapy that is programmatically accredited or part of an institution that is regionally accredited and by attaining appropriate primary certification from the ARRT or NMTCB.

Eligibility to take the ARRT postprimary examination in bone densitometry requires appropriate primary certification, documentation of structured education and clinical experience at the time of application. Those passing the bone densitometry postprimary examination use the credential R.T.(BD).

The ISCD is another certifying agency. Individuals with the appropriate primary certification who pass the certified bone densitometry technologist examination use the credential CBDT.

**Cardiac Interventional and Vascular Interventional Technology**

Only medical imaging and radiation therapy professionals who have completed the appropriate education and obtained certification(s) as outlined in these standards should perform cardiac interventional and vascular interventional procedures.

Cardiac interventional and vascular interventional technologists prepare for their roles on the interdisciplinary team by successfully completing a program in radiography that is programmatically accredited or part of an institution that is regionally accredited, and by attaining appropriate primary certification from the ARRT.

Eligibility to take the ARRT postprimary examination in vascular interventional radiography or cardiac interventional radiography requires appropriate primary certification in radiography, documentation of structured education and clinical experience at the time of application. Those passing the vascular interventional radiography examination use the credentials R.T.(R)(VI), and those passing the cardiac interventional radiography examination use the credentials R.T.(R)(CI). Individuals with the appropriate primary certification in radiography who have passed the ARRT postprimary examination in cardiovascular interventional radiography use the credentials R.T.(R)(CV).

CCI is another certifying agency. Individuals with primary certification in radiography who pass the cardiovascular invasive specialist examination as a postprimary certification use the credential RCIS.

**Computed Tomography**

Only medical imaging and radiation therapy professionals who have completed the appropriate education and obtained certification(s) as outlined in these standards should perform computed tomography procedures.

Computed tomography technologists prepare for their roles on the interdisciplinary team by successfully completing a program in radiography, radiation therapy or nuclear medicine technology that is programmatically accredited or part of an institution that is regionally accredited.
Eligibility to take a postprimary examination in computed tomography requires appropriate primary certification, documentation of structured education and clinical experience at the time of application. Those passing the ARRT computed tomography examination use the credential R.T.(CT). Those passing the NMTCB computed tomography examination use the credential NMTCB(CT).

**Limited X-ray Machine Operator**

Limited x-ray machine operators prepare for their roles on the interdisciplinary team in several ways. Various education and training programs for limited x-ray machine operators exist throughout the United States.

Many states require the completion of a program of study prior to administering a state licensure exam for limited x-ray machine operators. Several states use some or all of the Limited Scope of Practice in Radiography state licensing exams developed by the ARRT. States that administer an exam and issue a license or certification may use various terminologies to designate a limited x-ray machine operator. The limited x-ray machine operator may have limitations in performing ionizing radiation procedures specific to their scope of practice and may be prohibited from performing other tasks.

**Magnetic Resonance**

Only medical imaging and radiation therapy professionals who have completed the appropriate education and obtained certification(s) as outlined in these standards should perform magnetic resonance procedures.

Magnetic resonance technologists prepare for their role on the interdisciplinary team through one of the following:

- Successfully completing a program in magnetic resonance technology that is programmatically accredited or part of an institution that is regionally accredited, and by attaining certification in magnetic resonance from the ARRT.
- Possessing appropriate primary certification from the ARRT or NMTCB, documentation of structured education and clinical experience at the time of application and by attaining certification in magnetic resonance from the ARRT.

Those passing the ARRT magnetic resonance examination use the credential R.T.(MR).

**Mammography**

Only medical imaging and radiation therapy professionals who have completed the appropriate education and obtained certification(s) as outlined in these standards should perform mammography and breast sonography procedures.

Mammographers prepare for their roles on the interdisciplinary team by successfully completing a program in radiography that is programmatically accredited or part of an
institution that is regionally accredited, and by attaining appropriate primary certification from
the ARRT. Initial mammography training hours may be required at the federal or state level.

Eligibility to take the ARRT postprimary examination in mammography requires appropriate
primary certification, documentation of structured education and clinical experience at the time
of application. Those passing the mammography examination use the credential R.T.(M).

Eligibility to take the ARRT postprimary examination in breast sonography requires appropriate
primary and/or postprimary certification at the time of examination and documentation of
clinical experience in specific procedures. Those passing the breast sonography examination use
the credential R.T.(BS).

**Medical Dosimetry**

Only medical imaging and radiation therapy professionals who have completed the appropriate
education and obtained certification(s) as outlined in these standards should perform medical
dosimetry procedures.

Medical dosimetrists prepare for their roles on the interdisciplinary team by meeting the
examination eligibility criteria established by the MDCB.

Those passing the medical dosimetry examination use the credential CMD.

**Nuclear Medicine**

Only medical imaging and radiation therapy professionals who have completed the appropriate
education and obtained certification(s) as outlined in these standards should perform nuclear
medicine and molecular imaging procedures.

Nuclear medicine technologists prepare for their roles on the interdisciplinary team by
successfully completing a program in nuclear medicine that is programmatically accredited or
part of an institution that is regionally accredited, and by attaining appropriate primary
certification from the ARRT or the NMTCB. Those passing the ARRT examination use the
credential R.T.(N). Those passing the NMTCB examination use the credential CNMT.

Eligibility to take the NMTCB specialty examinations in nuclear cardiology, positron emission
tomography and/or radiation safety requires appropriate primary certification and documentation
of clinical experience at the time of the examination. Those who successfully complete these
examinations may use the credentials NCT, PET and/or RS, respectively.

**Quality Management**

Only medical imaging and radiation therapy professionals who have completed the appropriate
education and obtained certification(s) as outlined in these standards should perform quality
management procedures.

Quality management technologists prepare for their roles on the interdisciplinary team by
successfully completing a program in radiography, nuclear medicine technology or radiation
therapy that is programmatically accredited or part of an institution that is regionally accredited, and by attaining appropriate primary certification from the ARRT or the NMTCB.

Eligibility to take the ARRT postprimary examination in quality management requires appropriate primary certification, documentation of structured education and clinical experience at the time of application. Those passing the quality management postprimary examination use the credential R.T.(QM).

**Radiation Therapy**

Only medical imaging and radiation therapy professionals who have completed the appropriate education and obtained certification(s) as outlined in these standards should perform radiation therapy procedures.

Radiation therapists prepare for their roles on the interdisciplinary team by successfully completing a program in radiation therapy that is programmatically accredited or part of an institution that is regionally accredited and by attaining appropriate primary certification from the ARRT.

Those passing the ARRT radiation therapy examination use the credential R.T.(T).

**Radiography**

Only medical imaging and radiation therapy professionals who have completed the appropriate education and obtained certification(s) as outlined in these standards should perform radiographic procedures.

Radiographers prepare for their roles on the interdisciplinary team by successfully completing a program in radiography that is programmatically accredited or part of an institution that is regionally accredited, and by attaining appropriate primary certification from the ARRT.

Those passing the radiography examination use the credential R.T.(R).

**Radiologist Assistant**

Only radiographers who have completed the appropriate education and obtained certification(s) as outlined in these standards should perform radiologist assistant procedures.

Radiologist assistants prepare for their roles as midlevel providers in medical imaging by attaining primary certification in radiography from the ARRT, successfully completing a recognized radiologist assistant education program, and by attaining postprimary certification from the ARRT.

Those passing the registered radiologist assistant examination use the credential R.R.A.

**Sonography**

Only medical imaging and radiation therapy professionals who have completed the appropriate education and obtained certification(s) as outlined in these standards should perform sonography
procedures.

Sonographers prepare for their roles on the interdisciplinary team by successfully completing a program in sonography that is programmatically accredited or part of an institution that is regionally accredited, and by attaining appropriate primary certification from the ARRT, the ARDMS or CCI. Those passing the ARRT primary examination use the credential R.T.(S). Those passing the ARDMS examination(s) use the credentials RDMS, RDCS and/or RVT. Those passing the CCI examination(s) use the credentials RCS and/or RVS.

Eligibility to take the postprimary examinations in sonography requires appropriate primary certification, documentation of structured education and clinical experience at the time of application. Those passing these examinations use the credentials R.T.(S), R.T.(VS) and/or R.T.(BS).
Medical Imaging and Radiation Therapy Scope of Practice

Scopes of practice delineate the parameters of practice and identify the boundaries for practice. A comprehensive procedure list for the medical imaging and radiation therapy professional is impractical because clinical activities vary by the practice needs and expertise of the individual. As medical imaging and radiation therapy professionals gain more experience, knowledge and clinical competence, the clinical activities may evolve.

The medical imaging and radiation therapy professional and any individual who is legally authorized to perform medical imaging must be educationally prepared and clinically competent as a prerequisite to professional practice. The individual should, consistent with all applicable legal requirements and restrictions, exercise individual thought, judgment and discretion in the performance of the procedure. Federal and state statutes, regulations, accreditation standards and institutional policies could dictate practice parameters and may supersede these standards.

The scope of practice of the medical imaging and radiation therapy professional includes:

- Administering medications parenterally through new or existing vascular access, enterally or through other appropriate routes as prescribed by a licensed practitioner.*†
- Administering medications with an infusion pump or power injector as prescribed by a licensed practitioner.*†
- Applying principles of ALARA to minimize exposure to patient, self and others.
- Applying principles of patient safety during all aspects of patient care.
- Assisting in maintaining medical records, respecting confidentiality and established policy.
- Corroborating a patient’s clinical history with procedure and ensuring information is documented and available for use by a licensed practitioner.
- Educating and monitoring students and other health care providers.*
- Evaluating images for proper positioning and determining if additional images will improve the procedure or treatment outcome.
- Evaluating images for technical quality and ensuring proper identification is recorded.
- Identifying and responding to emergency situations.
- Identifying, preparing and/or administering medications as prescribed by a licensed practitioner.*†
- Performing ongoing quality assurance activities.
- Performing venipuncture as prescribed by a licensed practitioner.*†
- Postprocessing data.
- Preparing patients for procedures.
- Providing education.
- Providing optimal patient care.
- Receiving, relaying and documenting verbal, written and electronic orders in the patient’s medical record.*
- Selecting the appropriate protocol and optimizing technical factors while maximizing patient safety.
- Starting, maintaining and/or removing intravenous access as prescribed by a licensed practitioner.*†

* Excludes limited x-ray machine operator
† Excludes medical dosimetry
• Verifying archival storage of data.
• Verifying informed consent for applicable procedures.*

**Bone Densitometry**

• Performing and analyzing bone densitometry scans as prescribed by a licensed practitioner.

**Cardiac Interventional and Vascular Interventional**

• Assisting licensed practitioner with fluoroscopic and specialized interventional radiography procedures.
• Effectively panning the table during exposure.
• Maintaining intra-arterial access as prescribed by a licensed practitioner.
• Participating in physiologic monitoring of patients.
• Performing cardiovascular diagnostic/interventional procedures as prescribed by a licensed practitioner.
• Performing manual and mechanical hemostasis, including the use of vascular closure devices, as prescribed by a licensed practitioner.
• Performing noninterpretive fluoroscopic procedures as prescribed by a licensed practitioner.
• Placing, maintaining and removing peripherally inserted central catheters as prescribed by a licensed practitioner.

**Computed Tomography**

• Assisting a licensed practitioner with interventional computed tomography procedures.
• Performing computed tomography procedures as prescribed by a licensed practitioner.

**Limited X-ray Machine Operator**

• Assisting a licensed practitioner or radiographer during static radiographic procedures.
• Performing diagnostic radiographic procedures, as prescribed by a licensed practitioner, of a specific area of anatomical interest based on limited education, training and licensure/certification within the individual’s scope of practice.

**Magnetic Resonance**

• Applying principles of magnetic resonance safety to minimize risk to patient, self and others.
• Assisting the licensed practitioner with interventional procedures.
• Performing procedures for diagnostic interpretation or therapeutic intervention as prescribed by a licensed practitioner.
• Selecting appropriate pulse sequences with consideration given to established protocols and other factors influencing data acquisition parameters.

* Excludes limited x-ray machine operator
**Mammography**
- Imaging pathologic breast specimens as prescribed by a licensed practitioner.
- Performing breast ultrasound procedures as prescribed by a licensed practitioner.
- Performing mammographic procedures per facility policy or as prescribed by a licensed practitioner.
- Providing or assisting with physical breast inspections or palpation.

**Medical Dosimetry**
- Developing optimal treatment plans under the direction of a radiation oncologist.
- Evaluating treatment plans for accuracy.
- Monitoring, under the supervision of a radiation oncologist, doses to normal tissues within the irradiated volume to ensure tolerance levels are not exceeded.
- Obtaining and incorporating patient data from medical imaging procedures or manual methods to be used in simulation, treatment planning, treatment delivery and quality assurance.
- Participating in brachytherapy treatment planning and delivery.
- Participating in simulation under the supervision of a radiation oncologist.
- Performing dosimetric calculations.
- Performing or assisting with the fabrication of patient immobilization and other treatment devices.
- Transferring and documenting treatment planning data according to departmental policy.

**Nuclear Medicine**
- Identifying, preparing and/or administering ionizing radiation (radioactive material and computed tomography) and nonionizing radiation as prescribed by a licensed practitioner and under the supervision of an authorized user.
- Performing hybrid imaging, including PET-CT and SPECT-CT, for emission, transmission, and attenuation correction, anatomical location and for use in radiation therapy treatment planning when performed within hybrid imaging as prescribed by a licensed practitioner and under the supervision of an authorized user.
- Performing nuclear medicine procedures as prescribed by a licensed practitioner and under the supervision of an authorized user.

**Quality Management**
- Coordinating, performing and monitoring quality control procedures for all types of equipment.
- Creating policies and procedures to meet regulatory, accreditation and fiscal requirements.
- Determining and monitoring exposure factors and/or procedural protocols in accordance with ALARA principles and age-specific considerations.
- Ensuring adherence to accreditation, federal, state and local regulatory requirements.
- Facilitating change through appropriate management processes.
- Facilitating performance improvement processes.
• Facilitating the department’s quality assessment and improvement plan.
• Performing physics surveys independently on general radiographic and fluoroscopic equipment, with medical physicist oversight.
• Providing assistance to staff for image optimization, including patient positioning, proper equipment use and image critique.
• Providing input for equipment and software purchase and supply decisions when appropriate or requested.
• Providing practical information regarding quality management topics.
• Serving as a resource regarding regulatory, accreditation and fiscal requirements.
• Supporting and assisting a medical physicist with modality physics surveys.

**Radiation Therapy**

• Constructing/preparing immobilization, beam directional and beam-modification devices.
• Delivering radiation therapy treatments as prescribed by a radiation oncologist.
• Detecting and reporting significant changes in patients’ conditions and determining when to withhold treatment until the radiation oncologist is consulted.
• Monitoring, under the direction of a radiation oncologist, doses to normal tissues within the irradiated volume to ensure tolerance levels are not exceeded.
• Participating in brachytherapy procedures.
• Performing simulation, localization, treatment planning procedures and dosimetric calculations as prescribed by a radiation oncologist.
• Using imaging technologies for the explicit purpose of simulation, treatment planning and treatment delivery as prescribed by a radiation oncologist.

**Radiography**

• Assisting the licensed practitioner with fluoroscopic and specialized radiologic procedures.
• Performing diagnostic radiographic and noninterpretive fluoroscopic procedures as prescribed by a licensed practitioner.

**Radiologist Assistant**

• Assessing, monitoring and managing patient status, including patients under minimal and moderate sedation.
• Assisting with data collection and review for clinical trials or other research.
• Communicating the supervising radiologist’s report to the appropriate health care provider consistent with the ACR Practice Guidelines for Communication of Diagnostic Imaging Findings.
• Completing patient history and physical.
• Emphasizing patient safety and verifying procedure appropriateness by analyzing and incorporating evidenced-based practices for optimal patient care.
• Evaluating images for completeness and diagnostic quality and recommending additional images.
• Obtaining images necessary for diagnosis and communicating initial observations to the supervising radiologist. The radiologist assistant does not provide image interpretation as
defined by the ACR.
- Participating in or obtaining informed consent.
- Participating in quality improvement activities within the radiology practice.
- Performing or assisting with invasive or noninvasive imaging procedures as delegated by the radiologist who is licensed to practice and has privileges for the procedure being performed by the radiologist assistant.
- Providing follow-up patient evaluation.
- Reviewing variances identified through preprocedural evaluation that may influence the expected outcome with the supervising radiologist prior to the procedure.

**Sonography**
- Collaborating with a licensed practitioner in the performance of interventional procedures.
- Ensuring equipment parameters for diagnostic and therapeutic procedures are of optimal technical and administrative quality as requested by a licensed practitioner.
- Performing diagnostic and therapeutic ultrasound procedures as prescribed by a licensed practitioner or during appropriate educational activities.
Standards

Standard One – Assessment

The medical imaging and radiation therapy professional collects pertinent data about the patient, procedure, equipment, and work environment.

Rationale
Information about the patient’s health status is essential in providing appropriate imaging and therapeutic services. The planning and provision of safe and effective medical services relies on the collection of pertinent information about equipment, procedures and the work environment.

The medical imaging and radiation therapy professional:

General Criteria
- Assesses and maintains the integrity of medical supplies.
- Assesses factors that may affect the procedure, such as medications, patient history, patient preparation or artifact-producing objects.
- Assesses patient lab values, medication list and risk for allergic reaction(s) prior to procedure and administration of medication.*†
- Confirms that equipment performance, maintenance and operation comply with the manufacturer’s specifications.
- Determines that services are performed in a safe environment, minimizing potential hazards.
- Maintains restricted access to controlled areas.
- Obtains and reviews relevant previous procedures and information from all available resources and the release of information as needed.
- Participates in ALARA, patient and personnel safety, risk management and quality management activities.
- Recognizes signs and symptoms of an emergency.
- Verifies patient identification and appropriateness of the procedure requested or prescribed.
- Verifies that the patient has consented to the procedure.
- Verifies the patient’s pregnancy status.
- Verifies that protocol and procedure manuals include recommended criteria and are reviewed and revised.

Specific Criteria

Bone Densitometry
- Assesses patient compliance with prescribed treatment as it relates to the procedure.

* Excludes limited x-ray machine operator
† Excludes medical dosimetry
**Cardiac Interventional and Vascular Interventional**
Refer to general criteria

**Computed Tomography**
Refer to general criteria

**Limited X-ray Machine Operator**
- Complies with federal and state laws and regulations to minimize radiation exposure levels.
- Develops and maintains standardized exposure technique guidelines under the direction of a licensed practitioner or radiographer.
- Maintains and performs quality control on radiation safety equipment within the individual’s scope of practice.
- Performs quality assurance activities under the direction of a licensed practitioner, radiographer or medical physicist.

**Magnetic Resonance**
- Assesses patient for factors that may contribute to anxiety or claustrophobia.
- Identifies and removes items that may affect patient’s safety, damage the equipment or affect the image quality.
- Screens patient and others for potential magnetic resonance contraindications, either within the body or on their person, prior to entering the magnet room.

**Mammography**
- Assesses any potential patient limitations (body habitus, physical or mental capabilities) and modifies the performance of the procedure as necessary.
- Assesses the need for alternative procedures based on the patient’s age, hormonal status and the presence of surgical implants.
- Assists in setting policy and procedures in the facility to meet certification and accreditation standards specific to breast imaging.
- Establishes all required quality assurance and quality control test criteria.

**Medical Dosimetry**
- Assesses the environment for any potential radiation hazards.
- Assesses the patient’s need for information and reassurance.
- Reviews patient history for previous therapeutic treatments.

**Nuclear Medicine**
- Complies with federal and state laws to minimize radiation exposure levels.
- Maintains and performs quality control on radiation safety equipment according to regulatory agencies.
• Performs area monitoring and surveys to assess radiation exposure levels and contamination sites.
• Verifies the patient’s lactation or breastfeeding status.
• Verifies the patient’s menstrual cycle.

**Quality Management**

• Assesses policies, protocols and guidelines to improve safety, efficiency and patient care, and identify the potential impact to the facility.
• Identifies the customers served by medical imaging and radiation therapy.
• Identifies the processes used in customer service.
• Monitors compliance with universal precautions and standard precautions.
• Uses consistent and appropriate techniques to gather relevant information.

**Radiation Therapy**

• Assesses the environment for any potential radiation hazards.
• Assesses the patient’s need for information and reassurance.
• Identifies and/or removes objects that could interfere with prescribed treatment.
• Inspects ancillary devices prior to use.
• Monitors and assesses patients throughout the treatment course and follow-up visits.
• Monitors doses to normal tissues.
• Monitors side effects and reactions to treatment.
• Monitors treatment unit operation during use.
• Recognizes the patient’s need for referral to other care providers such as a social worker, nurse or dietitian.
• Reviews treatment protocol criteria and assesses conditions affecting treatment delivery.
• Reviews treatment record prior to treatment or simulation.

**Radiography**

• Complies with federal and state laws and regulations to minimize radiation exposure levels.
• Develops and maintains standardized exposure technique guidelines for all equipment.
• Maintains and performs quality control on radiation safety equipment.
• Reviews digital images for the purpose of monitoring radiation exposure.

**Radiologist Assistant**

• Assesses the patient’s level of anxiety and pain and informs the supervising radiologist.
• Interviews patient to obtain, verify and update medical history.
• Observes and assesses a patient who has received minimal and moderate sedation.
• Performs and documents a radiology-focused physical examination, analyzes data and reports findings to the supervising radiologist.

**Sonography**

Refer to general criteria
Standard Two – Analysis/Determination

The medical imaging and radiation therapy professional analyzes the information obtained during the assessment phase and develops an action plan for completing the procedure.

Rationale
Determining the most appropriate action plan enhances patient safety and comfort, optimizes diagnostic and therapeutic quality and improves efficiency.

The medical imaging and radiation therapy professional:

General Criteria
- Consults appropriate medical personnel to determine a modified action plan.
- Determines that all procedural requirements are in place to achieve a quality diagnostic or therapeutic procedure.
- Determines the appropriate type and dose of contrast media to be administered based on established protocols.※†
- Determines the course of action for an emergent situation.
- Determines the need for and selects supplies, accessory equipment, shielding, positioning and immobilization devices.
- Employs professional judgment to adapt imaging or therapeutic procedures to improve diagnostic quality or therapeutic outcomes.
- Evaluates and monitors services, procedures, equipment and the environment to determine if they meet or exceed established guidelines, and revises the action plan.
- Selects the most appropriate and efficient action plan after reviewing all pertinent data and assessing the patient's abilities and condition.

Specific Criteria

Bone Densitometry
Refer to general criteria

Cardiac Interventional and Vascular Interventional
- Analyzes and determines action plans in conjunction with the cardiovascular team.

Computed Tomography
- Reviews the patient’s medical record and the licensed practitioner’s request to determine optimal scanning protocol for clinical indication.

Limited X-ray Machine Operator
- Analyzes images to determine the use of appropriate imaging parameters.
- Analyzes the results of assessment activities under the direction of a licensed practitioner, radiographer and/or medical physicist.

※ Excludes limited x-ray machine operator
† Excludes medical dosimetry
• Verifies that exposure indicator data for digital radiographic systems has not been altered or modified and is included in the DICOM header and on images exported to media.

**Magnetic Resonance**
• Reviews the patient’s medical record and licensed practitioner’s request to determine optimal imaging parameters for clinical indications.
• Selects appropriate imaging coil.

**Mammography**
• Determines the need for additional projections to complete the procedure.

**Medical Dosimetry**
• Gathers and analyzes pertinent data relevant to the treatment planning and delivery process.
• Participates in reviewing patient treatment parameters and dose records to ensure treatment does not exceed the prescribed dose or normal tissue tolerances.
• Recommends the appropriate immobilization devices and positioning aids for simulation and treatment.
• Recommends when to hold treatment until a radiation oncologist is notified.
• Reviews the treatment record and verifies calculations before and/or after treatment delivery.
• Verifies the treatment summary and the mathematical accuracy of the prescription.

**Nuclear Medicine**
• Determines radiopharmaceutical dosage based on protocol, patient’s age, weight, medical and physical status.
• Evaluates results of quality control testing on radioactive material.
• Reviews the patient’s medical record and the examination request to determine optimal procedure parameters for clinical indications.
• Selects appropriate data acquisition equipment and accessories to perform the procedure.

**Quality Management**
• Assesses and prioritizes the current processes to improve quality while focusing on issues needing immediate response.
• Assesses proposed changes to minimize organizational disruption during implementation.
• Clarifies current steps in a process to minimize redundancy, reordering and improving service flow.
• Creates an effective action plan after reviewing all pertinent data while assessing possible options, fiscal impact and ease of implementation.
• Develops methods for minimizing hazards associated with medical imaging and radiation therapy procedures.
• Develops monitoring metrics.
• Establishes benchmarks and quality indicators to assess quality management issues.
• Monitors and develops methods to improve customer satisfaction.
• Monitors federal and state laws, regulations and accreditation standards that affect quality management in medical imaging and radiation therapy.

**Radiation Therapy**

• Determines when to contact the radiation oncologist or licensed practitioner regarding patient side effects or questions.
• Determines when to withhold treatment until a radiation oncologist is contacted.
• Ensures the appropriate imaging technique is chosen for image-guided radiation therapy procedures.
• Participates in decisions about appropriate simulation techniques and treatment positions.
• Reviews doses daily to ensure that treatment does not exceed prescribed dose, normal tissue tolerance or treatment protocol constraints.
• Reviews patient treatment plan and prescription prior to initial treatment delivery.
• Reviews patient treatment records prior to each treatment for prescription or treatment procedure changes.
• Reviews treatment record, calculations and/or treatment plan for accuracy prior to treatment delivery.
• Reviews verification images prior to treatment.
• Verifies the mathematical accuracy of the prescription and the daily treatment summary.

**Radiography**

• Analyzes images to determine the use of appropriate imaging parameters.
• Verifies that exposure indicator data for digital radiographic systems has not been altered or modified and is included in the DICOM header and on images exported to media.

**Radiologist Assistant**

• Reviews the patient’s medical record and the licensed practitioner’s request to determine optimal imaging procedure for clinical indications.

**Sonography**

• Monitors the patient’s need for information and reassurance throughout the procedure.
• Selects appropriate equipment and scanning techniques to optimize the procedure.
Standard Three – Education

The medical imaging and radiation therapy professional provides information about the procedure and related health issues according to protocol; informs the patient, public and other health care providers about procedures, equipment and facilities; and acquires and maintains current knowledge in practice.

Rationale

Education and communication are necessary to establish a positive relationship and promote safe practices. Advancements in the profession and optimal patient care require additional knowledge and skills through education.

The medical imaging and radiation therapy professional:

General Criteria

- Advocates for and participates in continuing education related to area of practice, to maintain and enhance clinical competency.
- Advocates for and participates in vendor specific applications training to maintain clinical competency.
- Educates the patient, public and other health care providers about procedures and the associated biological effects.
- Elicits confidence and cooperation from the patient, the public and other health care providers by providing timely communication and effective instruction.
- Explains effects and potential side effects of medications. **
- Maintains credentials and certification related to practice.
- Provides an accurate explanation and instructions at an appropriate time and at a level the patient and their care providers can understand; addresses questions and concerns regarding the procedure.
- Provides information on certification or accreditation to the patient, other health care providers and the public.
- Provides information to patients, health care providers, students and the public concerning the role and responsibilities of individuals in the profession.
- Provides pre-, peri- and post-procedure education.
- Refers questions about diagnosis, treatment or prognosis to a licensed practitioner.

Specific Criteria

Bone Densitometry

Refer to general criteria

Cardiac Interventional and Vascular Interventional

- Maintains competency in the use of diagnostic/interventional devices.

* Excludes limited x-ray machine operator
† Excludes medical dosimetry
Computed Tomography

- Maintains knowledge of the most current practices and technology used to minimize patient dose while producing diagnostic quality images.

Limited X-ray Machine Operator

- Maintains knowledge of the most current practices and technology used to minimize patient dose while producing diagnostic quality images.

Magnetic Resonance

- Provides magnetic resonance safety education to patient, health care providers and others.

Mammography

- Displays certificate(s) of compliance.
- Educates the patient about the need for adequate compression to achieve a quality mammogram and instructs the patient to communicate if the compression becomes intolerable.
- Educates the patient about the risk factors for breast cancer and the benefits of early detection.
- Educates the patient about the value and use of additional projections and alternative breast imaging procedures.
- Maintains clinical experience according to federal and state laws, regulations and guidelines.

Medical Dosimetry

- Addresses concerns from the patient and significant others about appropriate and essential uses of radiation in treatment of diseases.
- Explains the role and function of the medical dosimetrist in the overall treatment course.
- Reviews the treatment plan with the patient as requested by a radiation oncologist.

Nuclear Medicine

- Ensures radiation safety instruction information and limitations are provided to the patient following therapeutic procedures.
- Provides instruction to the patient and others regarding the reduction of radiation exposure during and after the procedure.

Quality Management

- Addresses questions and concerns regarding quality management.
- Develops and provides educational resources to improve the understanding of quality management in medical imaging and radiation therapy.
- Investigates and implements practices that enhance a safe environment.
Radiation Therapy

- Anticipates a patient’s need for information and provides it throughout the treatment course.
- Instructs other health care providers about radiation protection procedures.
- Instructs patient in the maintenance of treatment markings.
- Provides information and instruction on proper skin care, diet and self-care procedures.

Radiography

- Maintains knowledge of the most current practices and technology used to minimize patient dose while producing diagnostic quality images.

Radiologist Assistant

- Provides precare and postcare instructions to the patient under the supervision of a radiologist.

Sonography

Refer to general criteria
Standard Four – Performance

The medical imaging and radiation therapy professional performs the action plan and quality assurance activities.

Rationale

Quality patient services are provided through the safe and accurate performance of a deliberate plan of action. Quality assurance activities provide valid and reliable information regarding the performance of equipment, materials and processes.

The medical imaging and radiation therapy professional:

General Criteria

• Adheres to radiation safety rules and standards.
• Administers first aid or provides life support.†
• Applies principles of aseptic technique.†
• Assesses and monitors the patient’s physical, emotional and mental status.
• Consults with medical physicist or engineer in performing and documenting quality assurance tests.
• Explains to the patient each step of the action plan as it occurs and elicits the cooperation of the patient.
• Immobilizes patient for procedure.
• Implements an action plan.
• Maintains current information on equipment, materials and processes.
• Modifies the action plan according to changes in the clinical situation.
• Monitors the patient for reactions to medications. *‡
• Participates in safety and risk management activities.
• Performs ongoing quality assurance activities and quality control testing.
• Performs procedural timeout.
• Positions patient for anatomic area of interest, respecting patient ability and comfort.
• Uses accessory equipment.
• Uses an integrated team approach.
• When appropriate, wears one or more personal radiation monitoring devices at the location indicated on the personal radiation monitoring device or as indicated by the radiation safety officer or designee.

Specific Criteria

Bone Densitometry

• Applies the concepts of accuracy and precision in bone densitometry.
• Confirms patient position matches the selected scan parameters.
• Scans alternate sites when indicated.

* Excludes limited x-ray machine operator
† Excludes medical dosimetry
Cardiac Interventional and Vascular Interventional

- Coordinates and manages the collection and labeling of tissue and fluid specimens.
- Monitors electrocardiogram (ECG), blood pressure, respiration, oxygen saturation, level of consciousness and pain pre-, peri- and post-procedure.
- Provides a safe and sterile environment for patients and staff.

Computed Tomography

- Confirms patient position matches the selected scanning orientation parameters.
- Coordinates and manages the collection and labeling of tissue and fluid specimens.
- Determines optimum placement of electrocardiogram (ECG) electrodes and correctly identifies ECG wave trigger.
- Optimizes technical factors to minimize radiation exposure to the patient while maintaining diagnostic image quality.
- Uses radiation shielding devices.

Limited X-ray Machine Operator

- Performs assessment activities under the direction of a licensed practitioner, radiographer or medical physicist.
- Routinely reviews patient exposure records and reject analyses as part of the quality assurance program.
- Uses appropriate uniquely identifiable pre-exposure radiopaque markers for anatomical and procedural purposes.
- Uses pre-exposure collimation and proper field-of-view selection.

Magnetic Resonance

- Ensures that anyone who is pregnant is not in the magnetic resonance scanner bore or scan room during actual data acquisition or scanning, unless medically necessary.
- Identifies appropriate cardiac or respiratory triggers.
- Monitors the patient’s specific absorption rate and other factors related to patient heating.
- Positions imaging coil.
- Provides hearing protection to patient and others.
- Uses appropriate positioning and/or insulation materials to protect the patient from excessive heating and burns.

Mammography

- Applies appropriate radiopaque markers to the breast to indicate anatomic landmarks, including nipples, scars and lumps.
- Coordinates and manages the collection and labeling of tissue and fluid specimens.
- Ensures correct annotation of images.
- Exercises clinical judgment in the application of adequate compression to acquire a quality mammographic image.
- Informs the patient of the right to receive a lay summary result in accordance with the Mammography Quality Standards Act of 1992 (MQSA).
**Medical Dosimetry**

- Adheres to established best practice protocols, guidelines and radiation oncologist directives.
- Calculates treatment unit parameters and doses to treatment volumes and points of interest.
- Collaborates with the radiation therapist and medical physicist to fabricate individualized immobilization, custom blocks and other beam-modifying devices.
- Collaborates with the radiation therapist, medical physicist and radiation oncologist regarding the simulation process and procedures.
- Demonstrates safe handling, storing and disposal of brachytherapy sources.
- Develops a manual or computer-generated brachytherapy treatment plan as prescribed by a radiation oncologist.
- Develops a treatment plan as directed and prescribed by the radiation oncologist.
- Ensures an independent machine-setting check is completed before treatment is delivered.
- Makes the recommendation to discontinue patient treatment until equipment is operating properly.
- Prepares and positions the patient for simulation and treatment using appropriate positioning aids and immobilization devices.
- Prepares or assists in preparing brachytherapy sources and equipment.
- Reviews simulation images with the radiation therapist, medical physicist and radiation oncologist.
- Reviews treatment planning data for accuracy and appropriateness prior to input into the patient’s treatment record and initial treatment.

**Nuclear Medicine**

- Administers radioactive material and/or medication through existing vascular access devices.
- Coordinates and manages the collection and labeling of tissue and fluid specimens, including radiolabeling.
- Demonstrates safe handling, receipt, storage and disposal of radioactive materials.
- Determines optimum placement of electrocardiogram (ECG) electrodes and correctly identifies ECG wave trigger and/or pattern.
- Maintains security of radioactive material.
- Monitors shielding effectiveness.
- Uses radiation detecting equipment.
- Uses radiation shielding devices.
- Wears a ring badge on the dominant hand, with the label facing the radiation source.

**Quality Management**

- Assesses process flow.
- Collects and analyzes data using the standard tools associated with quality management.
- Identifies variables and implements changes to improve quality.
• Investigates sentinel events and continuously monitors measurements to minimize risk.
• Uses knowledge to modify current practices.

**Radiation Therapy**

• Achieves precision patient alignment using imaging and external markings.
• Assists the radiation oncologist in determining the optimum treatment field to cover the target volume.
• Calculates monitor units and treatment times.
• Consults with medical physicist and/or engineer in performing and documenting the quality assurance checks.
• Creates and manages simulation and verification images.
• Demonstrates safe handling, storage and disposal of brachytherapy sources.
• Makes the decision to discontinue patient treatment until equipment is operating properly.
• Monitors the patient visually and aurally during treatment.
• Monitors the treatment console during treatment.
• Obtains radiation oncologist’s approval of simulation images prior to initiation of treatment.
• Performs clinically indicated pretreatment imaging.
• Performs quality assurance checks on simulator, treatment unit and appropriate equipment.
• Prepares or assists in preparing brachytherapy sources and equipment.
• Uses knowledge of biological effects of ionizing radiation on tissue to minimize radiation dose to normal tissues.
• Verifies that only the patient is in the treatment room prior to initiating treatment or any imaging procedures.

**Radiography**

• Coordinates and manages the collection and labeling of tissue and fluid specimens.
• Routinely reviews patient exposure records and reject analyses as part of the quality assurance program.
• Uses appropriate uniquely identifiable pre-exposure radiopaque markers for anatomical and procedural purposes.
• Uses pre-exposure collimation and proper field-of-view selection.

**Radiologist Assistant**

• Administers medications as approved by the supervising radiologist.
• Administers minimal and moderate sedation as prescribed by the supervising radiologist.
• Collects and documents tissue and fluid specimens.
• Monitors patient’s physical condition during the procedure and responds to changes in patient vital signs, hemodynamics and level of consciousness.
• Participates in quality reporting measures for the purpose of improved patient care.
• Recognizes and responds to medical emergencies, activates emergency response systems and provides advanced life support intervention.
Sonography

- Coordinates and manages the collection and labeling of tissue and fluid specimens.
- Recognizes sonographic appearance of normal and abnormal tissue structures and physiological data.
Standard Five – Evaluation

The medical imaging and radiation therapy professional determines whether the goals of the action plan have been achieved, evaluates quality assurance results and establishes an appropriate action plan.

Rationale
Careful examination of the procedure is important to determine that expected outcomes have been met. Equipment, materials and processes depend on ongoing quality assurance activities that evaluate performance based on established guidelines.

The medical imaging and radiation therapy professional:

General Criteria
- Communicates the revised action plan to appropriate team members.
- Completes the evaluation process in a timely, accurate and comprehensive manner.
- Develops a revised action plan to achieve the intended outcome.
- Evaluates quality assurance results.
- Evaluates the patient, equipment and procedure to identify variances that might affect the expected outcome.
- Identifies exceptions to the expected outcome.
- Measures the procedure against established policies, protocols and benchmarks.
- Validates quality assurance testing conditions and results.

Specific Criteria

Bone Densitometry
- Evaluates and identifies unexpected serial bone mineral density changes.
- Reviews previous scan(s) and reanalyzes as necessary.
- Reviews T-scores and Z-scores to modify the action plan.

Cardiac Interventional and Vascular Interventional
- Evaluates access site for complications requiring intervention or further treatment.

Computed Tomography
Refer to general criteria

Limited X-ray Machine Operator
- Evaluates images for overall image quality of a specific area of anatomical interest based on limited education, training and licensure/certification within the individual’s scope of practice.
- Seeks assistance from a licensed practitioner or radiographer to improve the quality of the procedure.
Magnetic Resonance
Refer to general criteria

Mammography
- Collaborates with the lead interpreting physician and medical physicist to maintain equipment and comply with federal and state regulations and guidelines.
- Evaluates required quality control tests before breast imaging is performed.
- Reviews the inspection and medical physicist’s reports to assess the quality of the breast imaging equipment’s performance.

Medical Dosimetry
- Acquires data necessary to perform accurate patient protocol plans and participates in implementation of the plan.
- Ensures treatment parameters have been transferred correctly to the oncology information system.
- Reviews treatment calculations and ensures the validity of the treatment plan.
- Reviews treatment variances and assists in determining possible causes and solutions.

Nuclear Medicine
- Consults with a licensed practitioner to confirm diagnostic completeness.
- Reviews procedure to determine if additional images or data will enhance the diagnostic value.

Quality Management
- Confirms data is accurate and complete.
- Evaluates customer satisfaction.
- Evaluates measured processes and results against established policies, protocols, guidelines and benchmarks.
- Evaluates sentinel events to minimize risk.

Radiation Therapy
- Checks treatment calculations and/or treatment plan.
- Compares verification images to simulation images using anatomical landmarks or fiducial markers.
- Evaluates the patient daily for any side effects, reactions and therapeutic responses.
- Performs treatment chart checks.
- Reviews treatment discrepancies, determines causes and assists with the action plan.
- Reviews verification images for quality and accuracy.
- Verifies the accuracy of the patient setup prior to treatment delivery.
- Verifies treatment console readouts and settings prior to initiating treatment and upon termination of treatment.
Radiography

- Evaluates images for positioning to demonstrate the anatomy of interest.

Radiologist Assistant

Refer to general criteria

Sonography

Refer to general criteria
Standard Six – Implementation

The medical imaging and radiation therapy professional implements the revised action plan based on quality assurance results.

Rationale
It may be necessary to make changes to the action plan based on quality assurance results to promote safe and effective services.

The medical imaging and radiation therapy professional:

General Criteria
- Adjusts imaging parameters, patient procedure or additional factors to improve the outcome.
- Bases the revised plan on the patient’s condition and the most appropriate means of achieving the expected outcome.
- Implements the revised action plan.
- Notifies the appropriate health care provider when immediate clinical response is necessary, based on procedural findings and patient condition.
- Obtains assistance to support the quality assurance action plan.
- Takes action based on patient and procedural variances.

Specific Criteria

Bone Densitometry
Refer to general criteria

Cardiac Interventional and Vascular Interventional
Refer to general criteria

Computed Tomography
Refer to general criteria

Limited X-ray Machine Operator
- Performs additional images that will produce the expected outcome based on patient’s condition and procedural variance under the direction of a licensed practitioner or radiographer.

Magnetic Resonance
Refer to general criteria

Mammography
- Initiates procedures only when breast imaging equipment meets quality assurance and quality control requirements, and results are in compliance.
**Medical Dosimetry**

- Assists in supporting the quality assurance action plan.
- Develops additional treatment plans to achieve an optimal dose distribution.
- Ensures accuracy in the transfer and documentation of treatment parameters, according to departmental policies.
- Reviews and implements treatment field changes indicated on simulation or verification images as directed by a radiation oncologist.

**Nuclear Medicine**

- Employs devices to minimize radiation levels.
- Manages radioactive contamination and uses decontamination procedures.
- Performs additional images or data collections as needed.

**Quality Management**

- Develops policies, protocols and guidelines in collaboration with other health care providers.

**Radiation Therapy**

- Collaborates with radiation oncologists, medical physicists and medical dosimetrists to compensate for treatment inaccuracies.
- Establishes congruence between verification images and simulation images, digitally reconstructed radiographs and/or treatment volumes as defined by the radiation oncologist.
- Formulates recommendations for process improvements to minimize treatment discrepancies.
- Implements treatment plan or treatment field changes as directed by the radiation oncologist.
- Reports deviations from the standard or planned treatment.

**Radiography**

Refer to general criteria

**Radiologist Assistant**

Refer to general criteria

**Sonography**

Refer to general criteria
Standard Seven – Outcomes Measurement

The medical imaging and radiation therapy professional reviews and evaluates the outcome of the procedure according to quality assurance standards.

Rationale
To evaluate the quality of care, the medical imaging and radiation therapy professional compares the actual outcome with the expected outcome. Outcomes assessment is an integral part of the ongoing quality management action plan to enhance services.

The medical imaging and radiation therapy professional:

General Criteria
- Assesses the patient’s physical, emotional and mental status prior to discharge.
- Determines that actual outcomes are within established criteria.
- Evaluates the process and recognizes opportunities for future changes.
- Measures and evaluates the results of the revised action plan.
- Reviews all data for completeness and accuracy.
- Reviews and evaluates quality assurance processes and tools for effectiveness.
- Reviews the implementation process for accuracy and validity.
- Uses evidence-based practice to determine whether the actual outcome is within established criteria.

Specific Criteria

Bone Densitometry
Refer to general criteria

Cardiac Interventional and Vascular Interventional
Refer to general criteria

Computed Tomography
Refer to general criteria

Limited X-ray Machine Operator
Refer to general criteria

Magnetic Resonance
Refer to general criteria

Mammography
- Prepares the annual medical outcomes audit and provides results to the lead interpreting physician.
**Medical Dosimetry**
Refer to general criteria

**Nuclear Medicine**
Refer to general criteria

**Quality Management**
- Assesses differences between expected and actual outcomes.
- Assesses implemented changes for improvement.
- Develops methods to demonstrate continuous improvement.
- Develops strategies for maintaining improvement.
- Evaluates the effectiveness of and supports changes to processes.
- Performs procedural analysis.

**Radiation Therapy**
- Monitors patient status during procedures, throughout the treatment course and for follow-up care.

**Radiography**
Refer to general criteria

**Radiologist Assistant**
- Performs follow-up patient evaluation and communicates findings to the supervising radiologist.

**Sonography**
Refer to general criteria
Standard Eight – Documentation

The medical imaging and radiation therapy professional documents information about patient care, procedures and outcomes.

Rationale

Clear and precise documentation is essential for continuity of care, accuracy of care and quality assurance.

The medical imaging and radiation therapy professional:

General Criteria
- Archives images or data.
- Documents diagnostic, treatment and patient data in the medical record in a timely, accurate and comprehensive manner.
- Documents procedural timeout.
- Documents unintended outcomes or exceptions from the established criteria.
- Maintains documentation of quality assurance activities, procedures and results.
- Provides pertinent information to authorized individual(s) involved in the patient’s care.
- Records information used for billing and coding procedures.
- Reports any out-of-tolerance deviations to the appropriate personnel.
- Verifies patient consent is documented.

Specific Criteria

Bone Densitometry
Refer to general criteria

Cardiac Interventional and Vascular Interventional
- Documents administered medications.
- Documents or assists in documenting patient medical history related to the procedure.
- Documents radiation exposure parameters and initiates further action as needed.
- Documents use of sedation.
- Maintains documentation for tracking implantable devices.

Computed Tomography
- Documents the use of shielding devices and proper radiation safety practices.

Limited X-ray Machine Operator
- Documents radiation exposure.
- Documents the use of shielding devices and proper radiation safety practices.
Magnetic Resonance
Refer to general criteria

Mammography
- Documents and provides evidence of quality assurance and quality control outcomes according to established guidelines.
- Documents the location of previous breast imaging procedures and obtains authorization for the release of prior studies.

Medical Dosimetry
- Reports any treatment variances in accordance with departmental, institutional and national quality assurance guidelines.

Nuclear Medicine
- Documents administered dosage and route of administration in patient records.
- Documents instrumentation quality testing procedures and maintains results for review.
- Documents radioactive materials quality testing procedures and maintains results for inspection.
- Documents the implementation, evaluation and modification of the radiation safety plan under the authority of the radiation safety officer.
- Maintains records of the receipt, administration and disposal of radioactive materials.

Quality Management
- Documents goals and outcomes based on data analysis.
- Documents process flow variances and justifies exceptions.
- Documents steps used to improve processes.
- Maintains institutional policies, protocols and guidelines by continuously evaluating compliance issues.
- Provides reports as required by institutional policy, accrediting bodies and federal and state regulations.

Radiation Therapy
- Documents radiation exposure parameters.
- Maintains imaging and treatment records according to institutional policy.
- Reports any treatment discrepancies to appropriate personnel.

Radiography
- Documents fluoroscopic time.
- Documents radiation exposure.
- Documents the use of shielding devices and proper radiation safety practices.
**Radiologist Assistant**
- Communicates and documents radiologist’s order to other health care providers.
- Documents administration of medications.
- Documents and assists radiologist in quality reporting measures for the purpose of improved patient care.
- Documents use of minimal and moderate sedation.
- Reports clinical and imaging observations and procedure details to the supervising radiologist.

**Sonography**
- Documents initial impressions and technical data.
Standard Nine – Quality

The medical imaging and radiation therapy professional strives to provide optimal care.

Rationale
Patients expect and deserve optimal care during diagnosis and treatment.

The medical imaging and radiation therapy professional:

General Criteria
- Adheres to standards, policies and established guidelines.
- Anticipates, considers and responds to the needs of a diverse patient population.
- Applies professional judgment and discretion while performing the procedure.
- Collaborates with others to elevate the quality of care.
- Participates in ongoing quality assurance programs.

Specific Criteria

Bone Densitometry
- Advocates that facilities determine precision error and calculate the least significant change.

Cardiac Interventional and Vascular Interventional
Refer to general criteria

Computed Tomography
Refer to general criteria

Limited X-ray Machine Operator
Refer to general criteria

Magnetic Resonance
- Advocates the need for a minimum of one registered magnetic resonance technologist and one trained magnetic resonance safety personnel as the standard for safe and efficient delivery of magnetic resonance procedures.

Mammography
Refer to general criteria

Medical Dosimetry
Refer to general criteria
Nuclear Medicine
- Performs procedures in accordance with the NRC and/or in agreement with state regulations.

Quality Management
- Verifies the achievement of goals and identifies exceptions.

Radiation Therapy
- Advocates the need for a minimum of two credentialed radiation therapists to be present for any external beam patient treatment.

Radiography
Refer to general criteria

Radiologist Assistant
Refer to general criteria

Sonography
Refer to general criteria
Standard Ten – Self-Assessment

The medical imaging and radiation therapy professional evaluates personal performance.

Rationale
Self-assessment is necessary for personal growth and professional development.

The medical imaging and radiation therapy professional:

General Criteria
- Assesses personal work ethics, behaviors and attitudes.
- Evaluates performance, applies personal strengths and recognizes opportunities for educational growth and improvement.

Specific Criteria

Bone Densitometry
Refer to general criteria

Cardiac Interventional and Vascular Interventional
Refer to general criteria

Computed Tomography
Refer to general criteria

Limited X-ray Machine Operator
- Investigates avenues to continue progress to become a registered radiographer.

Magnetic Resonance
Refer to general criteria

Mammography
Refer to general criteria

Medical Dosimetry
Refer to general criteria

Nuclear Medicine
Refer to general criteria

Quality Management
Refer to general criteria
Radiation Therapy
Refer to general criteria

Radiography
Refer to general criteria

Radiologist Assistant
Refer to general criteria

Sonography
Refer to general criteria
Standard Eleven – Collaboration and Collegiality

The medical imaging and radiation therapy professional promotes a positive and collaborative practice atmosphere with other members of the health care team.

Rationale
To provide quality patient care, all members of the health care team must communicate effectively and work together efficiently.

The medical imaging and radiation therapy professional:

General Criteria
- Develops and maintains collaborative partnerships to enhance quality and efficiency.
- Informs and instructs others about radiation safety.
- Promotes understanding of the profession.
- Shares knowledge and expertise with others.

Specific Criteria

Bone Densitometry
Refer to general criteria

Cardiac Interventional and Vascular Interventional
Refer to general criteria

Computed Tomography
Refer to general criteria

Limited X-ray Machine Operator
Refer to general criteria

Magnetic Resonance
Refer to general criteria

Mammography
Refer to general criteria

Medical Dosimetry
Refer to general criteria

Nuclear Medicine
Refer to general criteria
**Quality Management**
Refer to general criteria

**Radiation Therapy**
Refer to general criteria

**Radiography**
Refer to general criteria

**Radiologist Assistant**
Refer to general criteria

**Sonography**
Refer to general criteria
Standard Twelve – Ethics

The medical imaging and radiation therapy professional adheres to the profession’s accepted ethical standards.

**Rationale**
Decisions made and actions taken on behalf of the patient are based on a sound ethical foundation.

The medical imaging and radiation therapy professional:

**General Criteria**
- Accepts accountability for decisions made and actions taken.
- Acts as a patient advocate.
- Adheres to the established ethical standards of recognized certifying agencies.
- Adheres to the established practice standards of the profession.
- Delivers patient care and service free from bias or discrimination.
- Provides health care services with consideration for a diverse patient population.
- Respects the patient’s right to privacy and confidentiality.

**Specific Criteria**

**Bone Densitometry**
Refer to general criteria

**Cardiac Interventional and Vascular Interventional**
Refer to general criteria

**Computed Tomography**
Refer to general criteria

**Limited X-ray Machine Operator**
Refer to general criteria

**Magnetic Resonance**
Refer to general criteria

**Mammography**
Refer to general criteria

**Medical Dosimetry**
Refer to general criteria
**Nuclear Medicine**
Refer to general criteria

**Quality Management**
- Promotes and monitors adherence to radiation safety standards.

**Radiation Therapy**
Refer to general criteria

**Radiography**
Refer to general criteria

**Radiologist Assistant**
Refer to general criteria

**Sonography**
- Opposes participation in sonography procedures for the purpose of nonmedical entrepreneurial application or entertainment contrary to the tenets of ethical medical practice.
Standard Thirteen – Research, Innovation and Professional Advocacy

The medical imaging and radiation therapy professional participates in the acquisition and dissemination of knowledge and the advancement of the profession.

Rationale
Participation in professional organizations and scholarly activities such as research, scientific investigation, presentation and publication advance the profession.

The medical imaging and radiation therapy professional:

General Criteria
- Adopts new best practices.
- Investigates innovative methods for application in practice.
- Monitors changes to federal and state law, regulations and accreditation standards affecting area(s) of practice.
- Participates in data collection.
- Participates in professional advocacy efforts.
- Participates in professional societies and organizations.
- Pursues lifelong learning.
- Reads and evaluates research relevant to the profession.
- Shares information through publication, presentation and collaboration.

Specific Criteria

Bone Densitometry
Refer to general criteria

Cardiac Interventional and Vascular Interventional
Refer to general criteria

Computed Tomography
Refer to general criteria

Limited X-ray Machine Operator
Refer to general criteria

Magnetic Resonance
Refer to general criteria

Mammography
Refer to general criteria
Medical Dosimetry
Refer to general criteria

Nuclear Medicine
Refer to general criteria

Quality Management
Refer to general criteria

Radiation Therapy
Refer to general criteria

Radiography
Refer to general criteria

Radiologist Assistant
Refer to general criteria

Sonography
Refer to general criteria
Glossary

The glossary is an alphabetical list of defined terms or words specifically found in the ASRT Practice Standards for Medical Imaging and Radiation Therapy. The terms or words have meaning that might not be general knowledge. The definitions are formulated using evidentiary documentation and put into place following extensive review and subsequent approval. The glossary is not all-inclusive. New terms and new usage of existing terms will emerge with time and advances in technology.

AAPM – American Association of Physicists in Medicine
ACR – American College of Radiology
advanced-practice radiographer – A registered technologist who has gained additional knowledge and skills through the successful completion of an organized program or radiologic technology education that prepares radiologic technologists for advanced-practice roles and has been recognized by the national certification organization to engage in advanced-practice radiologic technology.
adverse event – Any undesirable experience associated with the use of a medical product in a patient.

ALARA – Acronym for “as low as (is) reasonably achievable,” which means making every reasonable effort to maintain exposures to radiation as far below the dose limits as practical, consistent with the purpose for which the licensed activity is undertaken, while taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety and other societal and socioeconomic considerations, and in relation to the use of nuclear energy and licensed materials in the public interest. The ASRT recognizes the concept of ALARA to include energies used for magnetic resonance and sonographic imaging.
anatomic (anatomical) landmarks – Bones or other identifiable points that are visible or palpable and indicate the position of internal anatomy.
archive (archival) – The storage of data in either hard (film) or soft (digital) form.
ARDMS – American Registry for Diagnostic Medical Sonography
ARRT – American Registry of Radiologic Technologists
artifact – Extraneous information on the image that interferes with or distracts from image quality.

ASRT – American Society of Radiologic Technologists
authorized user – A physician, dentist or podiatrist who meets the requirements as defined by the United States Nuclear Regulatory Commission.
beam-modification devices – Devices that change the shape of the treatment field or distribution of the radiation at (tissue) depth.
brachytherapy – A type of radiation therapy in which radioactive material sealed in needles, seeds, wires or catheters is placed directly into or near a tumor. Also called implant radiation therapy, internal radiation therapy and radiation brachytherapy.
CCI – Cardiovascular Credentialing International

change management – Systematic approach to preparing for, implementing and sustaining a change in process.

clinical – Pertaining to or founded on actual observations and treatments of patients.

clinically competent – The ability to perform a clinical procedure in a manner that satisfies the demands of a situation, as assessed and documented by a qualified individual.

contrast media – A substance administered during a medical imaging procedure for the purpose of enhancing the contrast between an internal structure or fluid and the surrounding tissue.

cropping – The process of selecting and removing a portion of the image.

custom blocks – Devices designed to shape the radiation field.

DICOM – Acronym for “Digital Imaging and Communications in Medicine.” The DICOM standards are a complex set of instructions to exchange and present medical image information.

dose distribution – Spatial representation of the magnitude of the dose produced by a source of radiation. It describes the variation of dose with position within an irradiated volume.

dosimetric calculations – Computation of treatment unit settings, monitor units, treatment times and radiation doses to anatomical areas of interest.

educationally prepared – The successful completion of didactic and clinical education necessary to properly perform a procedure in accordance with accepted practice standards.

electronic masking – Electronic collimation or cropping of the digital radiographic image that occurs during postprocessing of the acquired image and does not alter the size of the irradiated field.

fiducial markers – Fixed reference points against which other objects can be measured. They may be placed internally, at skin surface or fixed externally to the patient.

GRADE – Grading of Recommendations Assessment, Development and Evaluation

hybrid imaging – The combination of imaging technologies that allows information from different modalities to be presented as a single set of images.

image-guided radiation therapy – A process of using various imaging techniques to localize the target and critical tissues and, if needed, reposition the patient just before or during the delivery of radiotherapy.

immobilization device – Device that assists in maintaining or reproducing the position while restricting patient movement.

initial observation – Assessment of technical image quality with pathophysiology correlation communicated to a radiologist.

interpretation – The process of examining and analyzing all images within a given procedure and integration of the imaging data with appropriate clinical data in order to render an impression or conclusion set forth in a formal written report composed and signed by a licensed practitioner.

interventional procedures – Invasive medical imaging guidance methods used to diagnose
and/or treat certain conditions.

**ISCD** – International Society for Clinical Densitometry

**JRC-DMS** – Joint Review Committee on Education in Diagnostic Medical Sonography

**least significant change** – The least amount of bone mineral densitometry change that can be considered statistically significant.

**licensed practitioner** – A medical or osteopathic physician, chiropractor, podiatrist or dentist who has education and specialist training in the medical or dental use of radiation and is deemed competent to perform independently or supervise medical imaging or radiation therapy procedures by the respective state licensure board.

**MDCB** – Medical Dosimetrist Certification Board

**medical physicist** – An individual who is competent to practice independently in the safe use of x-rays, gamma rays, electron and other charged particle beams, neutrons, radionuclides, sealed radionuclide sources, ultrasonic radiation, radiofrequency radiation and magnetic fields for diagnostic and therapeutic purposes. An individual is considered competent to practice in the field of medical physics if he or she is certified by the appropriate recognized certification organization.

**medication** – Any chemical substance intended for use in the medical diagnosis, cure, treatment or prevention of disease.

**minimal sedation (anxiolysis)** – A drug-induced state during which patients respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected.

**moderate sedation** – A drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.

**molecular imaging** – A biomedical discipline enabling the visualization, characterization and quantification of biologic processes taking place at the cellular and subcellular levels within intact living subjects.

**monitor units** – Unit of output measure used for linear accelerators, sometimes indicated with the abbreviation MU. Accelerators are calibrated so that 1 MU delivers 1 cGy for a standard reference field size at a standard reference depth at a standard source to calibration point.

**NECS** – National Education Curriculum for Sonography

**NMTCB** – Nuclear Medicine Technology Certification Board

**noninterpretive fluoroscopic procedures** – Use of fluoroscopic imaging under the direction of a licensed practitioner for purposes other than interpretation.

**normal tissue tolerance** – Radiation tolerance levels of healthy organs near or within the radiation treatment fields.

**NRC** – U.S. Nuclear Regulatory Commission
panning – Movement of the imaging equipment during image acquisition to maintain visualization of an anatomic region of interest.

personal radiation monitoring devices – Devices designed to be worn or carried by an individual for the purpose of measuring the dose of radiation received.

physics survey – Performing equipment testing, evaluating the testing results and completing a formal written report of results. The written survey report, validated by a medical physicist, contains sufficient information to document that each test was conducted according to local, federal or state requirements and includes an assessment of corrective actions and recommendations for improvements.

postprocessing – Computerized processing of data sets after acquisition to create a diagnostic or therapeutic image.

procedure – Specific course of action intended to result in an imaging study, treatment or other outcome.

protocol – The plan for carrying out a procedure, scientific study or a patient’s treatment regimen.

quality assurance – Activities and programs designed to achieve a desired degree or grade of care in a defined medical, nursing or health care setting or program. Sometimes indicated with the abbreviation QA.

quality control – The routine performance of techniques used in monitoring or testing and maintenance of components of medical imaging and radiation therapy equipment. This includes the interpretation of data regarding equipment function and confirmation that corrective actions are/were taken. Sometimes indicated with the abbreviation QC.

radiation oncologist – A physician who specializes in using radiation to treat cancer.

radiation protection – Prophylaxis against injury from ionizing radiation. The only effective preventive measures are shielding the operator, handlers and patients from the radiation source; maintaining appropriate distance from the source; and limiting the time and amount of exposure.

radioactive material – A substance composed of unstable atoms that decay with the spontaneous emission of radioactivity. Includes radiopharmaceuticals, unsealed sources (open, frequently in liquid or gaseous form) and sealed sources (permanently encapsulated, frequently in solid form).

radiobiology – The study of the effects of radiation on living organisms.

radiography – The process of obtaining an image for diagnostic examination using x-rays.

sentinel event – An unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof. Serious injury specifically includes loss of limb or function. The phrase “or the risk thereof” includes any process variation for which a recurrence would carry a significant chance of a serious adverse outcome.

setup – Arrangement of treatment parameters used in preparation for delivering radiation therapy; includes patient positioning data, field alignment information and equipment configurations.
shuttering – A postprocessing technique that may be used to eliminate ambient light around an image for the sole purpose of improving the quality of the displayed image. It should not be used as a substitute for insufficient collimation of the irradiated field.

simulation – A process using imaging technologies to plan radiation therapy so that the target area is precisely located and marked; the mockup procedure of a patient treatment with medical imaging documentation of the treatment portals.

SNMMI – Society of Nuclear Medicine and Molecular Imaging

static – Any medical image that is fixed or frozen in time.

supervising radiologist – A board-certified radiologist who oversees duties of the radiologist assistant and has appropriate clinical privileges for the procedure performed by the radiologist assistant.

timeout – Preprocedural pause to conduct a final assessment that the correct patient, site and procedure are identified.

tolerance levels (doses) – The maximum radiation dose that may be delivered to a given biological tissue at a specified dose rate and throughout a specified volume without producing an unacceptable change in the tissue.

treatment calculations – See dosimetric calculations.

treatment field (portal) – Volume of tissue exposed to radiation from a single radiation beam.

treatment planning – The process by which dose delivery is optimized for a given patient and clinical situation. It encompasses procedures involved in planning a course of radiation treatment, including simulation through completion of the treatment summary.


treatment record – Documents the delivery of treatments, recording of fractional and cumulative doses, machine settings, verification imaging and the ordering and implementation of prescribed changes.

T-score – Number of standard deviations the individual’s bone mineral density is from the average bone mineral density for gender-matched young normal peak bone mass.

vascular access device – Apparatus inserted into the peripheral or central vasculature for diagnostic or therapeutic purposes.

vascular closure device – Active or passive medical devices used to achieve hemostasis after a cardiovascular or endovascular procedure that requires catheterization.

venipuncture – The transcutaneous puncture of a vein by a sharp rigid stylet or cannula carrying a flexible plastic catheter or by a steel needle attached to a syringe or catheter.

verification images – Images produced to confirm accurate treatment positioning and accurate treatment portals.

Z-score – Number of standard deviations the individual’s bone mineral density is from the average bone mineral density for age- and gender-matched reference group.
Advisory Opinion Statements

Advisory opinion statements (AOSs) are interpretations of the practice standards. They are intended for clarification and guidance for specific practice issues.

The ASRT issues advisory opinions as to what constitutes appropriate practice. As such, an opinion is not a regulation or statute and does not have the force and effect of law. It is issued as a guidepost to medical imaging and radiation therapy professionals who wish to engage in safe practice. Federal and state laws, accreditation standards necessary to participate in government programs and institutional policies and procedures supersede these standards. The individual must be educationally prepared and clinically competent as a prerequisite to professional practice.

The profession holds medical imaging and radiation therapy professionals responsible and accountable for rendering safe, effective clinical services to patients and for judgments exercised and actions taken in the course of providing those services.

Acts that are within the recognized scope of practice for a given license or certification may be performed only by those individuals who possess the education and clinical proficiency to perform those acts in a safe and effective manner.

The medical imaging and radiation therapy professional’s performance should be evidence-based and consistent with federal and state laws, regulations, established standards of practice, facility policies and procedures. Links to external websites may change without notice.

Each medical imaging and radiation therapy professional must exercise professional and prudent judgment when determining whether the performance of a given act is within the scope of practice for which the individual is licensed, if applicable within the jurisdiction in which the person is employed, educationally prepared and clinically competent to perform.

The ASRT’s position is to determine the practice standards and scopes of practice for medical imaging and radiation therapy professionals. The practice standards emphasize the importance of an individual being educationally prepared and clinically competent to practice in the profession of medical imaging and radiation therapy.
Guidance for the Communication of Clinical and Imaging Observations and Procedure Details by Radiologist Assistants to Supervising Radiologists

After research of evidentiary documentation such as current literature, curricula, position statements, scopes of practice, laws, federal and state regulations and inquiries received by the ASRT, the ASRT issued opinions contained herein.

Advisory Opinion

It is the opinion of the ASRT that based upon current literature, curricula set forth by the ASRT, entry-level clinical activities by the ARRT, regulatory requirements and where federal or state law and/or institutional policy permits that:

1. Communication of clinical and imaging observations and procedure details by the radiologist assistant to the supervising radiologist is an integral part of radiologist assistant practice. Without clear, consistent, appropriate and ascribed communication between members of the radiology team, there is a possibility of inadequate patient care, incomplete reports and diminished departmental productivity. To create a safe and productive radiology environment, communication between the radiologist assistant and supervising radiologist must be free-flowing, consistent and relevant to the patient examination or procedure. This communication can take many forms, including verbal, written and electronic correspondence. These communications may be included and taken into consideration by the radiologist in creating a final report. However, initial clinical and imaging observations and procedure details communicated from the radiologist assistant to the radiologist are only intended for the radiologist’s use and do not substitute for the final report created by the radiologist. These communications should be considered and documented as “initial clinical and imaging observations or procedure details.”

2. While assisting radiologists in the performance of imaging procedures or during the performance of procedures under radiologist supervision, the radiologist assistant must be able to communicate and document procedure notes, observations, patient responses and other types of information relevant to the radiologist’s interpretation and creation of the final report. Radiologist assistants do not independently “report findings” or “interpret” by dictation or by any other means; and to avoid any confusion, these terms should not be used to refer to the activities of the radiologist assistant. However, radiologist assistants may add to the patient record (following the policies and procedures of the facility) in a manner similar to any other dependent nonphysician practitioner. Radiologist assistants who are authorized to communicate initial observations to the supervising radiologist using a voice recognition dictation system or other electronic means must adhere to institutional protocols ensuring that initial observations can be viewed or accessed only by the supervising radiologist. Initial clinical or imaging observations or procedure details created by the radiologist assistant resulting from the radiologist assistant’s involvement in the performance of the procedure that are included in the final report should be carefully reviewed by the supervising radiologist and should be incorporated at the supervising radiologist’s discretion.

With proper education and proven competence, the communication of clinical and imaging observations and procedure details by radiologist assistants to supervising radiologists provides
quality patient services in a safe environment.
GRADE: Strong

Definitions
The following definitions can be found in the glossary to the ASRT Practice Standards for Medical Imaging and Radiation Therapy:
- clinically competent
- educationally prepared

Evidentiary Documentation
Current Literature
Not applicable

Curricula
- Radiologist Assistant Curriculum (ASRT, 2015)

Communication of Findings and Validation of Clinical Practice

Description
Content introduces guidelines for communicating initial observations made by the radiologist assistant during imaging procedures and image assessments. The radiologist assistant’s role focuses on the systematic analysis of clinical practice—the diagnosis and treatment, resources, evidence-based decision making, procedures and resulting outcomes, including the patient’s quality of life.

Objectives
1. Communicate initial observations to the radiologist based on practice guidelines.
2. Identify the required legal components of a report of findings following diagnostic testing.
3. Establish and evaluate benchmarks as they apply to diagnostic imaging.
4. Explain the rationale for performing clinical audits.
5. Identify audit schemes applied to the clinical setting.
6. Identify measurement criteria and instruments employed during a clinical audit.
7. Describe how sensitivity and specificity measurements apply to diagnostic imaging.
8. Distinguish between positive and negative predictive values when evaluating the results of diagnostic imaging.
9. Discuss the importance of sampling and biases on the internal and external validity of audits of diagnostic accuracy.
10. Participate in specialty presentations.

Content
I. Clinical Reporting
   A. Legal considerations and requirements
   B. Composing, recording and archiving a report of initial observations
II. Evaluation of Diagnostic Accuracy
   A. Benchmarks
   B. Sensitivity and specificity
   C. Predictive values
   D. Prior probability
   E. Bias

III. Clinical Audit
   A. Rationale
   B. Audit schemes
      1. External quality assessment
      2. Internal quality assessment
      3. Accreditation
      4. Clinical governance (i.e., credentialing)
   C. Audit categories
      1. Access
      2. Process
      3. Output
      4. Outcome
      5. Use of resources
   D. Measurement criteria and instruments (i.e., ACR Appropriateness Criteria)

QUALITY OF EVIDENCE: High

Certification Agency Entry-Level Clinical Activities
   • Registered Radiologist Assistant Entry-Level Clinical Activities (ARRT, 2018)

The document states that radiologist assistants may “Review imaging procedures, make initial observations, and communicate observations ONLY [emphasis added] to the radiologist; record initial observations of imaging procedures following radiologist approval; communicate radiologist’s report to appropriate health care provider consistent with the ACR Practice Parameter for Communication of Diagnostic Imaging Findings.”

QUALITY OF EVIDENCE: High

Scopes of Practice and Practice Standards Reference
   • Scope of Practice
      o Communicating the supervising radiologist’s report to the appropriate health care provider consistent with the American College of Radiology Practice Guidelines for Communication of Diagnostic Imaging Findings.
      o Evaluating images for completeness and diagnostic quality and recommending additional images.
      o Obtaining images necessary for diagnosis and communicating initial observations to the supervising radiologist. The radiologist assistant does not provide image interpretation as defined by the American College of Radiology.
• Providing follow-up patient evaluation.

- The ASRT Practice Standards for Medical Imaging and Radiation Therapy
  o Performs follow-up patient evaluation and communicates findings to the supervising radiologist. (Standard Seven, radiologist assistant only)
  o Reports clinical and imaging observations and procedure details to the supervising radiologist. (Standard Eight, radiologist assistant only)
  o Maintains documentation of quality assurance activities, procedures and results. (Standard Eight)
  o Documents in a timely, accurate and comprehensive manner. (Standard Eight)
  o Documents and assists radiologist in quality reporting measures for the purpose of improved patient care. (Standard Eight, radiologist assistant only)

QUALITY OF EVIDENCE: High

Federal and State Statute References
Not applicable

Other
Not applicable

Approved: June 19, 2011
Amended, Main Motion, C-13.21 & C13.23, 2013
Amended, Main Motion, C-16.11, 2016
Amended, Main Motion, C-18.07, 2018
ASRT House of Delegates
Medication Administration by Medical Imaging and Radiation Therapy Professionals

After research of evidentiary documentation such as current literature, curricula, position statements, scopes of practice, laws, federal and state regulations and inquiries received by the ASRT, the ASRT issued opinions contained herein.

Advisory Opinion

It is the opinion of the ASRT that based upon current literature; curricula set forth by the ASRT, SNMMI and the NECS; certification examination specifications by the ARRT, NMTCB and CCI; recommendations by the ACR and Centers for Medicare & Medicaid Services; and where federal or state law and/or institutional policy permits that:

1. It is within the scope of practice for medical imaging and radiation therapy professionals to perform the parenteral administration of contrast media and other medications.
2. The parenteral administration of contrast media and other medications by medical imaging and radiation therapy professionals shall be performed only when a licensed practitioner is immediately available to ensure proper diagnosis and treatment of adverse events.

With proper education and proven competence, the parenteral administration of contrast media and other medications by medical imaging and radiation therapy professionals provides quality patient services in a safe environment when a licensed practitioner is immediately available to ensure proper diagnoses and treatment of possible adverse events.

GRADE: Strong

Definitions

The following definitions can be found in the glossary to the ASRT Practice Standards for Medical Imaging and Radiation Therapy:

- adverse event
- clinically competent
- educationally prepared
- licensed practitioner
- medication

Evidentiary Documentation

Current Literature


QUALITY OF EVIDENCE: High

Curricula
The ASRT curricula for all practice areas were reviewed.
• Cardiac-Interventional and Vascular-Interventional Curriculum (ASRT, 2014)
• Computed Tomography Curriculum (ASRT, 2018)
• Magnetic Resonance Curriculum (ASRT, 2015)
• Mammography Curriculum (ASRT, 2018)
• National Education Curriculum for Sonography (JRC-DMS, 2016)
• NEC Common Curricula (JRC-DMS, 2016)
• Nuclear Medicine Technology Competency-Based Curriculum Guide (SNMMI, 2013)
• Radiation Therapy Professional Curriculum (ASRT, 2014)
• Radiography Curriculum (ASRT, 2017)
• Radiologist Assistant Curriculum (ASRT, 2015)

QUALITY OF EVIDENCE: High

Certification Agency Examination Content Specifications
• Cardiac Interventional Radiography (ARRT, 2017)
• Computed Tomography (ARRT, 2017)
• Magnetic Resonance Imaging (ARRT, 2017)
• Nuclear Medicine Technology (ARRT, 2017)
• Radiation Therapy (ARRT, 2017)
• Radiography (ARRT, 2017)
• Registered Radiologist Assistant (ARRT, 2018)
• Vascular Interventional Radiography (ARRT, 2017)

Other Certification Agency Content Specifications
• Components of Preparedness (NMTCB, 2017)
• Examination Overview: Registered Cardiovascular Invasive Specialist (CCI, 2018)

QUALITY OF EVIDENCE: High

Scopes of Practice and Practice Standards Reference
• Scope of Practice*†
  o Identifying, preparing and/or administering medications as prescribed by a licensed practitioner.

QUALITY OF EVIDENCE: High

**Federal and State Statute References**
Not applicable

**Other**
Not applicable

Approved: July 1, 2012
Amended, Main Motion, C-13.21 and C13.23, 2013
Amended, Main Motion, C-16.13, 2016
Amended, Main Motion, C-17.09, 2017
Amended, Main Motion, C-18.11, 2018
ASRT House of Delegates

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* Excludes limited x-ray machine operator
† Excludes medical dosimetry
Medication Administration in Peripherally Inserted Central Catheter Lines or Ports With a Power Injector

After research of evidentiary documentation such as current literature, curricula, position statements, scopes of practice, laws, federal and state regulations and inquiries received by the ASRT, the ASRT issued the opinions contained herein.

**Advisory Opinion**

It is the opinion of the ASRT that based upon current literature; curricula set forth by the ASRT, ASRT Practice Standards for Medical Imaging and Radiation Therapy and SNMMI; certification examination specifications by the ARRT and NMTCB; and where federal or state law and/or institutional policy permits that:

1. It is within the scope of practice for medical imaging and radiation therapy professionals to access and use a Food and Drug Administration–approved peripherally inserted central catheter (PICC) line or port designated for use with power injectors, when manufacturer guidelines regarding infusion rate and pressure are followed and where federal or state law and/or institutional policy permits.

With proper education and proven competence, the use of power injectors with PICC lines or ports provides quality patient services in a safe environment.

GRADE: Strong

**Definitions**

access – The process of inserting the designated needle through the access point of an existing vascular access device to deliver intravenous (IV) fluids or medication.

The following definitions can be found in the glossary to the ASRT Practice Standards for Medical Imaging and Radiation Therapy:

- educationally prepared
- clinically competent

**Evidentiary Documentation**

*Current Literature*
Not applicable

*Curricula*

- Computed Tomography Curriculum (ASRT, 2018)
- Magnetic Resonance Curriculum (ASRT, 2015)
- Nuclear Medicine Technology Competency-Based Curriculum Guide (SNMMI, 2013)
- Radiography Curriculum (ASRT, 2017)
- Radiologist Assistant Curriculum (ASRT, 2015)

QUALITY OF EVIDENCE: High
Certification Agency Examination Content Specifications
- Components of Preparedness (NMTCB, 2017)
- Computed Tomography (ARRT, 2017)
- Vascular Intervenational Radiography (ARRT, 2017)

Other Certification Agency Content Specifications
- Components of Preparedness (NMTCB, 2017)
- Positron Emission Tomography (PET) Specialty Examination Content Outline (NMTCB, 2016)

QUALITY OF EVIDENCE: High

Scopes of Practice and Practice Standards Reference
- Scope of Practice*†
  - Administering medications parenterally through new or existing vascular access, enterally or through other appropriate routes as prescribed by a licensed practitioner.
  - Administering medications with an infusion pump or power injector as prescribed by a licensed practitioner.
  - Identifying, preparing and/or administering medications as prescribed by a licensed practitioner.

- The ASRT Practice Standards for Medical Imaging and Radiation Therapy*†
  - Uses accessory equipment. (Standard Four)

QUALITY OF EVIDENCE: High

Federal and State Statute Reference(s)
Not Applicable

Other
Approved: June 19, 2011
Amended, Main Motion, C-13.21 and C13.23, 2013
Amended, Main Motion, C-16.12, 2016
Amended, Main Motion, C-17.08, 2017
Amended, Main Motion, C-18.08, 2018
ASRT House of Delegates

* Excludes limited x-ray machine operator
† Excludes medical dosimetry
Medication Administration Through Existing Vascular Access

After research of evidentiary documentation such as current literature, curricula, position statements, scopes of practice, laws, federal and state regulations and inquiries received by the ASRT, the ASRT issued opinions contained herein.

Advisory Opinion

It is the opinion of the ASRT that based upon current literature; curricula set forth by the ASRT, SNMMI and the NECS; certification examination specifications by the ARRT, NMTCB and CCI; recommendations by the ACR; and where federal or state law and/or institutional policy permits that:

1. It is within the scope of practice for medical imaging and radiation therapy professionals to access and administer medications through existing vascular access.

With proper education and proven competence, accessing and administering medications through existing vascular access provides quality patient services in a safe environment.

GRADE: Strong

Definitions

access – The process of inserting the designated needle through the access point of an existing vascular access device to deliver IV fluids or medication.

existing vascular access – Peripheral or central vascular implanted devices or external access lines that include, but are not limited to, peripherally inserted central catheter lines, intravenous lines, central lines and ports.

The following definitions can be found in the glossary to the ASRT Practice Standards for Medical Imaging and Radiation Therapy:

- clinically competent
- educationally prepared
- medication

Evidentiary Documentation

Current Literature

QUALITY OF EVIDENCE: High

Curricula
- Cardiac-Interventional and Vascular-Interventional Curriculum (ASRT, 2014)
- Computed Tomography Curriculum (ASRT, 2018)
- Magnetic Resonance Curriculum (ASRT, 2015)
- Mammography Curriculum (ASRT, 2018)
- National Education Curriculum for Sonography (JRC-DMS, 2016)
- NEC Common Curricula (JRC-DMS, 2016)
- Nuclear Medicine Technology Competency-Based Curriculum Guide (SNMMI, 2013)
- Radiation Therapy Professional Curriculum (ASRT, 2014)
- Radiography Curriculum (ASRT, 2017)
- Radiologist Assistant Curriculum (ASRT, 2015)

QUALITY OF EVIDENCE: High

Certification Agency Examination Content Specifications
- Computed Tomography (ARRT, 2017)
- Magnetic Resonance Imaging (ARRT, 2017)
- Nuclear Medicine Technology (ARRT, 2017)
- Radiography (ARRT, 2017)
- Registered Radiologist Assistant (ARRT, 2018)
- Vascular Interventional Radiography (ARRT, 2017)

Other Certification Agency Content Specifications
- Components of Preparedness (NMTCB, 2017)
- Examination Overview: Registered Cardiovascular Invasive Specialist (CCI, 2018)

QUALITY OF EVIDENCE: High

Scopes of Practice and Practice Standards Reference
- Scope of Practice*†
  - Administering medications parenterally through new or existing vascular access, enterally or through other appropriate routes as prescribed by a licensed practitioner.
  - Identifying, preparing and/or administering medications as prescribed by a licensed practitioner.
  - Performing venipuncture as prescribed by a licensed practitioner.
  - Starting, maintaining and/or removing intravenous access as prescribed by a licensed practitioner.

QUALITY OF EVIDENCE: High

Federal and State Statute References
Not applicable

* Excludes limited x-ray machine operator
† Excludes medical dosimetry
Other
Not applicable

Approved: July 1, 2012
Amended, Main Motion, C-13.21 and C13.23, 2013
Amended, Main Motion, C-16.14, 2016
Amended, Main Motion, C-17.10, 2017
Amended, Main Motion, C-18.12, 2018
ASRT House of Delegates
Placement of Personal Radiation Monitoring Devices

After research of evidentiary documentation such as current literature, curricula, position statements, scopes of practice, laws, federal and state regulations and inquiries received by the ASRT, the ASRT issued opinions contained herein.

Advisory Opinion

It is the opinion of the ASRT that based upon current literature; curricula set forth by the ASRT and SNMMI; certification examination specifications by the ARRT and NMTCB; regulatory requirements; AAPM recommendations; and where federal or state law and/or institutional policy permits that:

1. Radiation workers wear a personal radiation monitoring device outside of protective apparel with the label facing the radiation source at the level of the thyroid to approximate the maximum dose to the head and neck.
2. In specific cases, a whole-body monitor may be indicated. This monitor should be worn at the waist under a protective lead apron.
3. In some cases, a ring monitor may be indicated. This monitor should be worn on the dominant hand with the label facing the radiation source.

With proper education and proven competence, the determination of proper use of personal monitoring devices provides quality patient services in a safe environment.

GRADE: Strong

Definitions

The following definition can be found in the glossary to the ASRT Practice Standards for Medical Imaging and Radiation Therapy:

- personal radiation monitoring device

Evidentiary Documentation

Current Literature


QUALITY OF EVIDENCE: High

Curricula

- Bone Densitometry Curriculum (ASRT, 2014)
• Positron Emission Tomography (PET)-Computed Tomography (CT) Curriculum (ASRT, 2004)
• Nuclear Medicine Technology Competency-Based Curriculum Guide (SNMMI, 2013)
• Radiation Therapy Professional Curriculum (ASRT, 2014)
• Radiography Curriculum (ASRT, 2017)
• Radiologist Assistant Curriculum (ASRT, 2015)

QUALITY OF EVIDENCE: High

Certification Agency Examination Content Specifications
• Cardiac Interventional Radiography (ARRT, 2017)
• Limited Scope of Practice in Radiography (ARRT, 2018)
• Nuclear Medicine Technology (ARRT, 2017)
• Radiation Therapy (ARRT, 2017)
• Radiography (ARRT, 2017)
• Registered Radiologist Assistant (ARRT, 2018)
• Vascular Interventional Radiography (ARRT, 2017)

Other Certification Agency Content Specifications
• Components of Preparedness (NMTCB, 2017)

QUALITY OF EVIDENCE: High

Scopes of Practice and Practice Standards Reference
Not applicable

Federal and State Statute References
• § 19.12 Instruction to Workers (NRC, 2018)
• § 20.1208 Dose Equivalent to an Embryo/Fetus (NRC, 2018)
• § 20.1502 Conditions Requiring Individual Monitoring of External and Internal Occupational Dose (NRC, 2018)
• Regulatory Guide 8.34: Monitoring Criteria and Methods to Calculate Occupational Radiation Doses (NRC, 1992)
• Regulatory Guide 8.36: Radiation Dose to the Embryo/Fetus (NRC, 2018)
• Regulatory Guide 8.7: Instructions for Recording and Reporting Occupational Radiation Exposure Data (NRC, 2016)

QUALITY OF EVIDENCE: High

Other
AAPM Report No. 58: Managing the Use of Fluoroscopy in Medical Institutions. Appendix A: Radiation Safety/Quality Assurance Program

QUALITY OF EVIDENCE: High
approved: July 1, 2012
Amended, Main Motion, C-13.21 & C13.23, 2013
Amended, Main Motion, C-16.15, 2016
Amended, Main Motion, C-18.09, 2018
ASRT House of Delegates
Use of Postexposure Shuttering, Cropping and Electronic Masking in Radiography

After research of evidentiary documentation such as current literature, curricula, position statements, scopes of practice, laws, federal and state regulations, and inquiries received by the ASRT, the ASRT issued opinions contained herein.

Advisory Opinion

It is the opinion of the ASRT that based upon current literature, curricula set forth by the ASRT, certification examination specifications by the ARRT, and recommendations by the ACR that:

1. It is within the scope of practice of a radiologic technologist to determine and apply appropriate pre-exposure collimation to individual projections of examinations to comply with the principle of ALARA. Postexposure shuttering, cropping, electronic collimation or electronic masking to eliminate the visibility of large regions of brightness are acceptable, where automatic processing fails to do so.

2. It is outside of the scope of practice of a radiologic technologist to use postexposure shuttering, cropping, electronic collimation or electronic masking to eliminate any anatomical information. This information is a part of the patient’s permanent medical record and should therefore be presented to the licensed practitioner to determine whether the exposed anatomy obtained on any image is significant or of diagnostic value.

3. It is outside the scope of practice of a radiologic technologist to use postexposure shuttering, cropping, electronic collimation or electronic masking to duplicate and use any acquired image for more than one prescribed view or projection on any exam. Facilities acquiring digital images are legally required to retain information in the DICOM information of each image that identifies the selected view or projection at the time of image acquisition. Using the same acquired image to represent two different prescribed views or projections is a falsification of the information in the patient medical record and imaging study made available to the licensed practitioner.

With proper education and proven competence, the elimination of improper use of postexposure shuttering, cropping and electronic masking provides quality patient services in a safe environment.

GRADE: Strong

Definitions

- processing: Manipulation of the raw data just after acquisition.

The following definitions can be found in the glossary to the ASRT Practice Standards for Medical Imaging and Radiation Therapy:

- cropping
- DICOM
- electronic masking
- shuttering
Evidentiary Documentation
Current Literature


QUALITY OF EVIDENCE: High
*Curricula*
Not applicable

*Certification Agency Content Specifications*
Not applicable

*Scopes of Practice and Practice Standards Reference*

- **Scope of Practice**
  - Applying principles of ALARA to minimize exposure to patient, self and others.

- **The ASRT Practice Standards for Medical Imaging and Radiation Therapy**
  - Analyzes digital images to determine the use of appropriate imaging parameters. (Standard Two)
  - Optimizing technical factors in accordance with the principles of ALARA. (Standard Two)
  - Verifies that exposure indicator data for digital radiographic systems has not been altered or modified and is included in the DICOM header and on images exported to media. (Standard Two)
  - Employs proper radiation safety practices. (Standard Four)
  - Optimizes technical factors according to equipment specifications to meet the ALARA principle. (Standard Four)
  - Positions patient for anatomic area of interest, respecting patient ability and comfort. (Standard Four)
  - Uses pre-exposure collimation and proper field-of-view selection. (Standard Four)
  - Adheres to the established practice standards of the profession. (Standard Five)
  - Evaluates images for overall image quality of a specific area of anatomical interest based on limited education, training and licensure/certification within the scope of practice (Standard Five, limited x-ray machine operator only).
  - Evaluates images for optimal technical exposure factors. (Standard Five, radiography only)
  - Evaluates images for positioning to demonstrate the anatomy of interest. (Standard Five, radiography only)
  - Recognizes the need to adjust patient position or technical exposure factors to improve the quality of the procedure. (Standard Five, limited x-ray machine operator only)
  - Reviews images to determine if additional images will enhance the diagnostic value of the procedure. (Standard Five, radiography only)
  - Performs additional images that will produce the expected outcomes based upon patient condition and procedural variances. (Standard Six, radiography only)
  - Performs additional images that will produce the expected outcome based on patient’s condition and procedural variance under the direction of a licensed practitioner or radiographer. (Standard Six, limited x-ray machine operator only)

QUALITY OF EVIDENCE: High
Federal and State Statute References
Not applicable

Other
Not applicable

Approved: June 28, 2015
Adopted, Main Motion, C-15.23, 2015
Amended, Main Motion, C-18.10, 2018
ASRT House of Delegates