Magnetic Resonance Imaging

Candidates for certification and registration under the postprimary eligibility pathway are required to meet the Professional Requirements specified in the *ARRT Rules and Regulations*. ARRT's *Magnetic Resonance Imaging Clinical Experience Requirements* describe the specific eligibility requirements that must be documented as part of the application for the certification and registration process.

The purpose of the clinical experience requirements is to document that candidates have performed a subset of the clinical procedures within a discipline. Successful performance of these fundamental procedures, in combination with mastery of the cognitive knowledge and skills as documented by the examination requirement, provides the basis for the acquisition of the full range of clinical skills required in a variety of settings.

The requirements are periodically updated based upon a practice analysis which is a systematic process to delineate the job responsibilities typically required of magnetic resonance imaging (MRI) technologists. The result of this process is a task inventory. A practice analysis committee then determines the number of clinical procedures required to demonstrate adequate candidate experience in performing the tasks on the inventory.

Candidates for magnetic resonance imaging (MRI) certification and registration must document performance of a minimum of 125 repetitions of magnetic resonance imaging procedures according to the criteria noted below. Procedures are documented, verified, and submitted when complete via an online worksheet accessible through your account on arrt.org. ARRT encourages individuals to obtain education and experience beyond these minimum requirements.

Completion of each procedure must be verified by an ARRT certified and registered technologist (postprimary certification not required) or an interpreting physician. The verification process is described within the online worksheet. The candidate can document up to 7 procedures per day in the online worksheet.

For postprimary clinical experience requirement procedures, clinical verifiers are responsible for verifying the candidate's completion of procedures in accordance with ARRT requirements. Clinical verifiers are not required to directly observe the candidate performing the procedure and may perform their verification responsibilities remotely.

MRI Safety Requirements

Candidates must demonstrate completion of training and education in the 10~~eight~~ areas of MRI safety listed below:

- ~~Screening patients, personnel, and nonpersonnel for MR Safe, MR Conditional, and MR Unsafe devices and objects~~
- ~~Identify MR safety zones~~
- ~~Static magnetic field (*e.g., translational and rotational forces)~~
- ~~Radiofrequency field (e.g., thermal heating [SAR], coil positioning, patient positioning, insulation)~~
- ~~Gradient magnetic fields (e.g., induced current, auditory considerations)~~
- ~~Communication and monitoring considerations (e.g., sedated patients, verbal and visual contact, vital signs)~~
- ~~Contrast media safety (e.g., NSF, renal function)~~
- ~~Other MRI safety considerations (e.g., cryogen safety, fire, medical emergencies, laser alignment lights, quench)~~

*These requirements were converted into the table below.

*"e.g." is used to indicate examples of the topics covered, but is not a complete list

MRI Safety Requirements	Date Completed	Competence Verified By
Screening Patients, Personnel, and Non-Personnel for MR Safe, MR Conditional, and MR Unsafe Devices and Objects		
Identify and Implement Implant Specific Parameters		
Identify MR Safety Zones		
Static Magnetic Field (e.g., Translational and Rotational Forces)		
Radiofrequency Field (e.g., Thermal Heating [SAR], Coil Positioning, Patient Positioning, Insulation)		
Gradient Magnetic Fields (e.g., Induced Current, Auditory Considerations)		
Communication and Monitoring Considerations (e.g., Sedated Patients, Verbal and Visual Contact, Vital Signs)		
Contrast Media Safety (e.g., Acute Adverse Events, Renal Function, Pregnancy)		
Other MRI Safety Considerations (e.g., Cryogen Safety, Fire, Medical Emergencies, Laser Alignment Lights, Quench)		
Differentiate the Roles and Responsibilities Between Non MR Personnel and Level I or Level II MR Personnel		

Completion of the MRI safety requirements must be verified by an ARRT certified and registered technologist (postprimary certification not required), a medical physicist, or an interpreting physician.

*The abbreviation “e.g.,” is used to indicate that examples are listed in parenthesis, but that it is not a complete list of all possibilities.

Specific MRI Procedure Requirements

The clinical experience requirements for MRI consist of 6349 procedures in six different categories. The six categories are:

A. Head and Neck
B. Spine
C. Thorax
D. Abdomen and Pelvis
E. Musculoskeletal
F. Additional Imaging Procedures

Candidates must document the performance of complete, diagnostic quality procedures according to the following rules:

- Choose a minimum of 21 different procedures out of the 6349 procedures on the following pages.
- Complete and document a minimum of 3 and a maximum of 6 repetitions of each chosen procedure; less than 3 will not be counted.
- Complete a total of 125 repetitions across all procedures.
- One patient may be used to document more than one competency. However, each individual procedure may be used for only one competency. No more than 1 procedure may be documented per patient per day. For example, an MRI of the abdomen cannot be used for both liver and kidneys. if an order requests an MRA of the head and neck for one patient, only one of these, including the postprocessing procedures, can be used for clinical experience documentation. The candidate cannot perform more than three competencies per day on the same patient.
- MRI procedures performed in conjunction with a PET scan or Radiation Therapy planning or LINAC procedure are not eligible for MRI Clinical Experience documentation.
- Remote scanning is not acceptable for completion of ARRT Clinical Requirements. The candidate must complete the examination or procedure at the facility where the patient and equipment are located. The candidate must be physically present during the examination or procedure.

For postprimary clinical experience requirement procedures, clinical verifiers are responsible for verifying the candidate's completion of procedures in accordance with ARRT requirements. Clinical verifiers are not required to directly observe the candidate performing the procedure and may perform their verification responsibilities remotely.

Examples

The hypothetical scenarios below illustrate two ways of satisfying the clinical experience requirements. Numerous other combinations are possible.

Candidate A: This person works in a specialized setting and wanted to complete the minimum number of procedures. This candidate chose 21 different procedures and performed 6 repetitions of each procedure, for a total of 126 repetitions.

Candidate B: This person works in a facility that does most types of MRI scans, so completing a wide variety of procedures was quite feasible. This candidate completed a total of 42 procedures. Although most of these procedures were performed 3 times (the minimum), a few of them were performed 4 or 5 times each until the candidate reached at least 125 repetitions.

General Guidelines for MRI Procedures

To qualify as a complete, diagnostic quality MRI procedure, the candidate must independently demonstrate appropriate:

Patient skills including:

- evaluation of requisition and/or medical record
- identification of patient
- documentation of patient history including allergies
- safety screening
- patient education concerning the procedure
- patient care and assessment
- preparation of examination room
- Standard Precautions
- preparation and/or administration of contrast media
- MRI safety procedures and precautions
- patient discharge with postprocedure instructions

Technical and procedural skills including:

- selection of optimal imaging coil
- patient positioning
- protocol selection
- parameter selection
- data acquisition
- image display, networking, and archiving
- postprocessing
- documentation of procedure and patient data in appropriate records
- data acquisition
- implementing implant specific conditions

Evaluation skills including:

- analysis of the image for technical quality
- demonstration of correct anatomic regions
- proper identification on images and patient data
- recognition of relevant pathology
- exam completeness

MRI Clinical Experience Requirement Procedures

A. Head and Neck
1. brain (e.g., MS, seizure)
2. internal auditory canal (IACs)
3. pituitary
4. orbits
5. cranial nerves (nonIACs) (e.g., skull base, trigeminal nerve)
6. vascular head MRA
7. vascular head MRV
8. brain perfusion
9. ~~brain spectroscopy~~
10. CSF flow
11. CSF leaks
12. face (e.g., sinuses)
13. soft tissue neck (e.g., parotids, thyroid)
14. vascular neck MRA
15. vascular neck MRV

B. Spine
1. cervical
2. thoracic
3. lumbar
4. total spine (large FOV)
5. spinal trauma
6. sacrum and ~~-~~coccyx
7. sacroiliac (SI) joints
8. lumbar plexus

C. Thorax
1. chest (noncardiac) (e.g., mediastinal mass, chest wall)
2. breast (e.g., screening and diagnostic, breast implant)
3. vascular chest MRA~~thorax~~
4. vascular chest MRV
5. brachial plexus

D. Abdomen and Pelvis
1. liver
2. iron quantification
3. pancreas
4. MRCP
5. adrenals
6. kidneys
7. enterography
8. vascular abdomen MRA
9. vascular abdomen MRV
10. soft tissue pelvis (e.g., bladder, rectum)
11. female soft tissue pelvis (e.g., uterus)
12. male soft tissue pelvis (e.g., prostate)
13. vascular pelvis MRA
14. vascular pelvis MRV

E. Musculoskeletal
   1. temporomandibular joints (TMJs)
   2. sternum~~/~~
   3. sternoclavicular (SC) joints
   4. shoulder
   5. scapula
   6. long bones (upper extremity)
   7. elbow
   8. wrist
   9. hand
   10. finger (2nd-5th digits)~~/thumb~~
   11. thumb
   12. bony pelvis
   13. hip
   14. long bones (lower extremity)
   15. knee
   16. ankle
   17. foot
   18. arthrogram
   19. vascular extremities (e.g., runoff MRA)
   20. soft tissue (e.g., tumor, infection)

F. Additional Imaging Procedures
   1. image postprocessing (MIP reformation, MPR, subtraction)
   ~~2. CINE (e.g., CSF flow study, TMJs)~~

QC as a topic was moved to separate requirements (see next page).

MRI Quality Control Procedures

Candidates must demonstrate competence in the 10~~7~~ quality control activities listed below. The first 7~~4~~ procedures are performed on a QC phantom.

MRI Quality Control Procedures	Date Completed	Competence Verified By
~~Signal to Noise Ratio~~ Table Position Accuracy		
Center Frequency		
Transmitter Gain or Attenuation		
Geometric Accuracy		
High Contrast Spatial Resolution		
Low Contrast Detectability		
Artifact Evaluation		
Equipment Inspection (e.g., Coils, Cables, Door Seals)		
Monitor Cryogen Levels		
Room Temperature and Humidity		

Completion of the MRI quality control procedures must be verified by an ARRT certified and registered technologist (postprimary certification not required), a medical physicist, or an interpreting physician.