Magnetic Resonance Imaging

Certification and registration requirements for magnetic resonance imaging (MRI) are based on the results of a comprehensive practice analysis conducted by The American Registry of Radiologic Technologists (ARRT) staff and the MRI Practice Analysis Committee. The purpose of the practice analysis is to identify job responsibilities typically required of MRI technologists at entry into the profession. The results of the practice analysis are reflected in this document. The attached task inventory is the foundation for the clinical experience requirements and the content outline which, in turn, is the foundation for the content specifications and CQR SSA content specifications.

Basis of Task Inventory

In 2023, the ARRT surveyed a large, national sample of MRI technologists to identify their responsibilities. When evaluating survey results, the advisory committee applied a 40% criterion. That is, to be included on the task inventory, an activity must have been performed by at least 40% of MRI technologists. The committee could include an activity that did not meet the 40% criterion if there was a compelling rationale to do so (*e.g., a task that falls below the 40% criterion but is expected to rise above the 40% criterion in the near future).

Application to Clinical Competency Requirements

The purpose of the clinical requirements is to document that individuals have demonstrated competence performing the clinical activities fundamental to a particular discipline. Competent performance of these fundamental activities, in conjunction with mastery of the cognitive knowledge and skills as documented by the examination requirement, provides the basis for acquisition of the full range of procedures typically required in a variety of settings. Demonstration of clinical competence means the candidate has performed the procedure independently, consistently, and effectively during the course of their formal education.

Application to Clinical Experience Requirements

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.

An activity must appear on the task inventory to be considered for inclusion in the clinical competency or clinical experience requirements. For an activity to be designated as a mandatory requirement, survey results had to indicate that MRI technologists performed that activity. The committee designated clinical activities performed by fewer MRI technologists, or which are carried out only in selected settings, as elective. The *Magnetic Resonance Imaging Didactic and Clinical Requirements* and the *Magnetic Resonance Imaging Clinical Experience Requirements* are available from ARRT's website (www.arrt.org).

Application to Content Specifications

The purpose of the examination is to assess the knowledge and cognitive skills underlying the intelligent performance of the tasks typically required in MRI for practice at entry level. The content specifications identify the knowledge areas underlying performance of the tasks on the task inventory. Every content category can be linked to one or more activities on the task inventory. Note that each activity on the task inventory is followed by a content category that identifies the section of the content specifications corresponding to that activity. The *Magnetic Resonance Imaging Content Specifications* are available from ARRT's website (www.arrt.org).

*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.

Activity	Content Categories
	Legend: PC = Patient Care, S = Safety, IP = Image Production, P = Procedures
1. Prioritize procedures (e.g., imaging examinations) to avoid affecting subsequent examinations.	PC.1.G.1.D.
2. Verify the patient's identity.	PC.1.A.2.A., PC.1.B.
3. Evaluate the patient's ability to understand and comply with requirements for the requested examination (e.g., need for medical interpreter, physical, sensory, or cognitive impairments).	PC.1.B.
4. Obtain pertinent medical history.	PC.1.B.3.C., PC.1.G.1., S.1.A.
5. Manage interpersonal interactions in an effective manner.	PC.1.B.
6. Explain and confirm the patient's preparation (e.g., diet restrictions, preparatory medications, allergies) prior to imaging.	PC.1.B.3.B.
7. Review the examination request to verify information is accurate, appropriate, and complete (e.g., patient history, clinical diagnosis, physician's order).	PC.1.A.2.A.
8. Explain examination instructions to the patient, the patient's family, or authorized representative (e.g., pre- and postprocedure).	PC.1.B.
9. Respond as appropriate to examination inquiries from the patient, patient's family, or authorized representative (e.g., scheduling delays, examination duration, other imaging disciplines).	PC.1.B.
10. Monitor the patient's auxiliary medical equipment (e.g., IVs, oxygen).	PC.1.C.2.
11. Verify examination protocols.	PC.1.A.2.A., P.
12. Follow environmental protection standards for the handling and disposing of biohazardous materials (e.g., sharps, blood, body fluids).	PC.1.E.3.
13. Follow environmental protection standards for handling hazardous materials (e.g., cleaning materials, disinfectants).	PC.1.F.
14. Provide for patient safety, comfort, and privacy.	PC.1.A.1.C., PC.1.C.
15. Notify appropriate personnel of adverse events or incidents (e.g., patient falls, burns, contrast reactions, wrong patient imaged).	PC.1.A.2., PC.1.C.3., PC.1.D., PC.1.G.5.
16. Demonstrate and promote professional and ethical behavior (e.g., confidentiality, regulation compliance).	PC.1.A., PC.1.B.
17. Verify that informed consent is obtained as necessary.	PC.1.A.1.A.
18. Verify a time-out is performed as necessary.	PC.1.C.3.G.
19. Recognize abnormal or missing lab values relative to the imaging ordered (e.g., eGFR, creatinine, beta-hCG).	PC.1.G.4.C.
20. Communicate relevant information to appropriate members of the care team (e.g., critical findings).	PC.1.A., PC.1.B., PC.1.C.3., PC.1.D., PC.1.G., P.
21. Practice Standard Precautions.	PC.1.E.3.
22. Follow appropriate transmission-based precautions.	PC.1.E.
23. Use positioning aids, as needed, to enhance the examination and promote patient comfort and/or safety.	PC.1.A.2.D., PC.1.C., P.

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24.	Use proper ergonomics and MRI appropriate patient transfer devices to promote patient and personnel safety.	PC.1.C.1.
25.	Review information to prepare appropriate type and dosage (e.g., IV contrast, oral contrast).	PC.1.G.
26.	Prior to the administration of a contrast agent, determine if the patient is at risk for an adverse reaction.	PC.1.G.1, PC.1.G.4., PC.1.G.5.
27.	Use sterile or aseptic technique when indicated.	PC.1.E.2., PC.1.G.2.
28.	Perform venipuncture.	PC.1.E.3.D.,PC.1.G.2.
29	Program and/or activate power injector.	PC.1.G.2.E.
30.	Assess the patient after administration of a contrast agent to detect adverse events.	PC.1.D.1., PC.1.G.5.
31	Monitor the patient after administration of a medication, other than a contrast agent, to detect adverse events	PC.1.D., PC.1.G.5.
32.	Obtain vital signs (e.g., pulse, blood pressure) when appropriate.	PC.1.C.3.A.
33.	Monitor patient sedation.	PC.1.C.3.E.
34.	Recognize and communicate the need for prompt medical attention.	PC.1.C.3., PC.1.D., PC.1.G.5.
35.	Recognize the need for and initiate emergency care (e.g., evacuate the patient from Zone IV, call a code, initiate CPR) as needed.	PC.1.C.1., PC.1.D.
36	Recognize and respond to equipment-based emergencies (e.g., fire, quench) as needed.	S.1.D.4
37.	Clean, disinfect, or sterilize facilities and equipment.	PC.1.E.2.
38.	Document required information in the patient's medical record (e.g., images, contrast, adverse events).	PC.1.C.3.,PC.1.D., PC.1.G.5., IP.3.C.
39.	Provide hearing protection to the patient and others in Zone IV.	PC.1.B.3.,PC.1.C.3.D., S.1.B.3.B., S.1.B.3.E.
40.	Maintain controlled access to Zones III and IV to ensure safety of patients, visitors, and hospital personnel.	S.1.
41.	Evaluate the impact of the magnetic field strength, RF, and SAR on implants or devices.	S.1.A.1.
42.	Screen the patient for contraindications to MR imaging.	PC.1.B.3.C., S.1.A.
43	Screen the patient for pregnancy.	S.1.A.3.
44.	Monitor RF induced heating (SAR).	PC.1.D.3., S.1.B.2.A., S.1.B.2.E.
45.	Perform and document the results of QC tests (e.g., center frequency, signal to noise ratio, image quality, artifacts).	IP.1.D.
46.	Interpret results of QC tests to assure that performance standards are met.	IP.1.D.
47.	Inspect equipment to make sure it is operable and safe (e.g., coils, cables, door seals).	S.1.C., IP.1.D.8.

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48.	Notify appropriate personnel of equipment malfunctions and potential repairs as needed.	S.1.C., S.1.D.
49.	Research implantable medical devices for safe, conditional, or unsafe labeling.	PC.1.B.3.C., S.1.A.1.
50.	Monitor scan room (e.g., cryogen levels, temperature, humidity).	S.1.D.1.
51.	Select appropriate imaging sequences.	IP.1.A., IP.1.B., IP.3.A., IP.3.B., P.
52.	Select alternate sequences to compensate for patient related issues or patient limitations (e.g., patient motion, metal artifact, claustrophobia, RF heating).	PC.1.C.3.F., IP.1., IP.2.
53.	Manipulate parameters to compensate for patient related issues or patient limitations (e.g., patient motion, metal artifact, claustrophobia, RF heating).	PC.1.C.3.F., IP.1., IP.2.
54.	Select optimal imaging coils.	IP.1.A.3., P.
55.	Perform frequency tuning.	IP.1.B.3.F., IP.1.D.5., IP.2.A.12., P.
56.	Select or adjust one or more imaging parameters (e.g., TR, TE, FOV, imaging plane, bandwidth, gap, slice thickness).	IP.2.A.
57.	Select or adjust one or more imaging options (e.g., saturation pulse, flow compensation, fat suppression, gating).	IP.2.C.
58.	Perform image postprocessing (e.g., MPR, subtraction).	IP.3.B.4.
59.	Assess images to determine successful completion of the procedure (e.g., anatomy, pathology, artifacts).	IP.1.C., IP.2., IP.3.A., IP.3.B., P.
60.	Optimize technical parameters to maintain or correct diagnostic image quality.	IP.1.C.,IP.2.,IP.3.A., IP.3.B., P.
61.	Verify exam coding.	PC.1.A.2.A.
62.	Store, transfer, or retrieve images to/from data storage devices (e.g., PACS, DICOM).	IP.3.C.

Enter patient data, position the patient, and perform the following types of scans or procedures:

Head and Neck

63.	Brain (e.g., trauma, stroke)	P.1.A.1.
64.	Brain for MS	P.1.A.2.
65.	Brain for seizure	P.1.A.3.
66.	Infant brain (e.g., less than one year old)	P.1.A.4.
67.	Brain perfusion	P.1.A.5.
68.	CSF flow	P.1.A.6.
69.	Brain spectroscopy	P.1.A.7.
70.	IACs	P.1.A.8.
71.	Pituitary	P.1.A.9.
72.	Orbits	P.1.A.10.

Activity

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No.	Activity	Content Categories
73.	Cranial nerves (nonIACs)	P.1.A.11.
74.	Sinuses	P.1.A.12.
75.	Soft tissue neck	P.1.A.13.
76.	Vascular head MRA	P.1.A.14.
77.	Vascular head MRV	P.1.A.14.
78.	Vascular neck	P.1.A.15.
	Spine	
79.	Cervical	P.1.B.1.
80.	Thoracic	P.1.B.2.
81.	Lumbar	P.1.B.3.
82.	Sacroiliac (SI) joints	P.1.B.4.
83.	Sacrum-coccyx	P.1.B.5.
84.	Spinal trauma	P.1.B. Focus of Questions.
85.	Total spine	P.1.B.6.
86.	Lumbar plexus	P.1.B.7.
	Thorax	
87.	Chest (noncardiac)	P.2.A.1.
88.	Breast	P.2.A.2.
89.	Vascular thorax	P.2.A.3.
90.	Brachial plexus	P.2.A.4.
	Abdomen	
91.	Liver	P.2.B.1.
92.	Pancreas	P.2.B.2.
93.	Adrenals	P.2.B.3.
94.	Kidneys	P.2.B.4.
95.	Enterography	P.2.B.5.
96.	Vascular abdomen (MRV, MRA)	P.2.B.6.
97.	MRCP	P.2.B.7.
	Pelvis	
98.	Soft tissue pelvis (e.g., bladder, rectum)	P.2.C.1.
99.	Female soft tissue pelvis (e.g., uterus)	P.2.C.2.
100.	Male soft tissue pelvis (e.g., prostate)	P.2.C.3.
101.	Vascular pelvis (MRV, MRA)	P.2.C.4.

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Musculoskeletal	
102. Temporomandibular joints (TMJs)	P.3.A.
103. Sternum	P.3.B.
104. Sternoclavicular (SC) joints	P.3.C.
105. Shoulder	P.3.D.
106. Long bones (upper extremity)	P.3.E.
107. Elbow	P.3.F.
108. Wrist	P.3.G.
109. Hand	P.3.H.
110. Fingers (nonthumb)	P.3.I.
111. Thumb	P.3.J.
112. Bony pelvis	P.3.K.
113. Hip	P.3.L.
114. Long bones (lower extremity)	P.3.M.
115. Knee	P.3.N.
116. Ankle	P.3.O.
117. Foot	P.3.P.
118. Arthrogram	P.3.Q.
119. Vascular extremities (e.g., runoff MRA)	P.3.R.
120 Soft tissue (e.g., tumor, infection, injury)	P.3.S.
Other Procedures	
121. CINE (e.g., CSF flow study, TMJs)	P. Focus of Questions.
122. Surgical preplanning (e.g., image guided surgery software)	P. Focus of Questions.