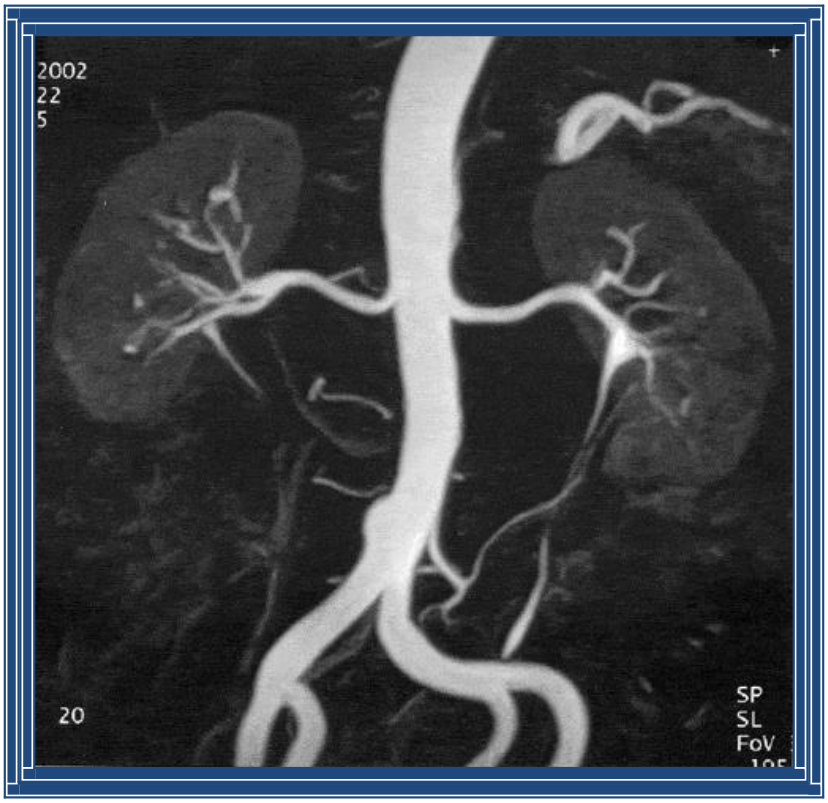
Magnetic Resonance Imaging Program



Clinic Handbook Semester I

2022-2023 Academic Year

PO Box 8062
Morgantown, WV 26506
(304) 293-8802

Radiologic Technology Education Programs
MRI

Course Outline Semester I Clinic

Course: Applied MRI Procedures I (MRIT 410)

Clock Hours: 683

Semester: Fall 2022

Prerequisite: N/A

Instructor(s): Various Clinical Instructors

Room(s): HSC Siemens Aera 1.5T;
Ruby Siemens Sola 1.5T; Ruby Vida 3T
POC Siemens Aera 1.5T; POC GE Architect 3T
UTC Siemens Aera 1.5T; RNI Siemens Prisma 3T

Time: *Monday – Friday*: Whenever the student is not in the classroom
Clinic Rotation Hours: 7:30 am – 4:00 pm

Course Description:

This is the first of two courses that offers the student clinical education in MRI. This course takes place in the MRI Departments of the Health Science Center (HSC), Ruby Memorial Hospital (Ruby), Physician Office Center (POC), University Town Centre (UTC), and Rockefeller Neuroscience Institute (RNI). This course incorporates a minimum of two (2) weeks and a maximum of one (1) month rotations through clinical areas that include 1.5T and 3T magnets. The student will be oriented to the department and patient care. The student will perform MRI procedures under direct supervision. The student also receives instruction and experience in regard to technologist responsibilities for shifts during the daytime hours.

Course Objectives:

1. Abide by the dress code and other policies as stated in the Student Handbook
2. Develop proficiency and confidence in the performance of routine MRI examinations by functioning under direct supervision
3. Identify when to modify a protocol and successfully perform the modification
4. Properly screen patients for contraindications to MR
5. Ensure patient safety by correlating surgical, accident, and occupational history
6. Maintain a clean, comfortable and safe environment
7. Employ proper precautions to prevent disease transmission
8. Demonstrate how to properly prepare a patient for the requested exam
9. Ensure that professional performance and competence is reflected throughout an exam
10. Ensure proper setup of MR coils, equipment, table accessories and cushioning
11. Achieve a minimum of 86% on each Comprehensive examination as well as the overall clinic grade
12. To complete the minimum number of Semester I Clinical Competencies

Clinical Grading Calculation:

The student's grade consists of several components, each utilizing a different mechanism to assure a complete and comprehensive evaluation of clinical performance. The following components and weighted averages are utilized:

Component	Weighted Average
Daily Log Sheets	5%
Clinical Preceptor Points	10%
Orientation Checklists	10%
Evaluations	10%
ARRT Mandatory Competencies	20%
Total Clinical Competencies	30%
Comprehensive Exams	15%

Clinical Grading Scale:

93 – 100	A
86 – 92	B
78 – 85	C
70 – 77	D
0 – 69	F

****STUDENTS MUST COMPLETE MRIT 410 WITH A **MINIMUM GRADE OF 86%** "B" TO PROCEED TO THE NEXT SEMESTER****

Daily Log Sheets:

Each day, students will report the procedures which were observed or performed on the Daily Log sheet in the Trajecsys Clinical Report System.

The following participations levels are used when filling out the Daily Log sheet:

1. **Observed** (Level **1**): Student may help with patient care and setting up of room but only watches and learns while the MRI technologist performs the entire exam.

2. **Assisted** (Level **3**): Student may help with patient care and setting up of room. Also, the student will sit at the console and perform the exam with the MRI technologist. The MRI technologist will provide assistance or prompting during the exam.

3. **Performed Independently** (Level **5**): Student may help with patient care and setting up of room. Also, the student will sit at the console and perform the entire exam independently. The MRI technologist will only observe and not provide any assistance during the exam.

Delinquent (more than 5 days) log sheets will result in a 5% reduction (on each occurrence) in this component of the clinic grade. Daily Log Sheets carry a weighted average of 5% towards the overall clinic grade.

After observing, having been assisted by the MRI technologist and independently performing the required repetitions, a clinical competency exam will be administered for each procedure identified on the clinical competency form.

Competency categories include, but are not limited to, the procedures from the following sites/systems:

- Head & Neck
- Spine
- Thorax
- Abdomen & Pelvis
- Musculoskeletal (MSK)
- Special Imaging Procedures or Ancillary Procedures

Clinical Preceptor Points:

Prior to mid-term and at the end of the Semester I, the Clinical Preceptor will evaluate each student using the "Clinical Preceptor Points Evaluation Form". Each category in the form is worth 1 to 5 points and the total points are divided by the total number of categories (15) to get a value between 1 and 5. Clinical Preceptor Points carry a weighted average of 10% towards the overall clinic grade.

Orientation Checklist:

At the beginning of each new rotation, the student will be given an Orientation Checklist for his/her assigned scanner. These checklists are to familiarize the student with their new area with various objectives and tasks. Completing each item on the checklist and turning it in earns the student one (1) point. Orientation Checklists carry a weighted average of 10% towards the overall clinic grade.

Weekly Student Performance Evaluations:

At the completion of each week in the assigned clinical area, an "Entry-Level Student Evaluation Form" or the regular "Student Evaluation Form" needs to be completed by your Staff Technologist on Trajecsys. This evaluation represents his/her estimation of your overall performance. ***The "Entry-Level" form will only need to be used during July to September.***

After your Mid-Term Evaluation, the regular "Student Evaluation" form will be used. Each individual evaluation is scored from 1 to 5 points *(**1** = Unsatisfactory; **2** = Needs Improvement; **3** = Average; **4** = Above Average; **5** = Excellent)* and the combined average of each section will determine your weekly evaluation points. These points will be included in the student's overall Clinical Performance Evaluation category, which carries a weighted average of 10% towards the overall clinic grade. If more than one evaluation is submitted per rotation, the average of the points will be counted. Failure to complete one of these evaluations after each clinical rotation will result in the student receiving no points for the category.

Staff Clinical Instructor Evaluations:

At the end of each rotation, the student is required to complete a "Staff Clinical Instructor Evaluation" on Trajecsys. These will be used to evaluate the quality of the technologist's clinical instruction. These evaluations will be worth one (1) point towards the student's evaluated performance. Failure to complete one of these evaluations after each clinical rotation will result in the student receiving no points for the category. These points will be included in the student's overall "Clinical Performance Evaluation" category, which carries a weighted average of 10% towards the clinic grade.

Mandatory Competencies:

"ARRT Mandatory Competencies" are to be completed throughout each semester. There is not a set number of Competencies due at each mid-term, but a total of nineteen (19) competencies are due at the end of the year. These required competencies are worth 20% of your overall clinic grade. See the 2022-23 Clinic Guidelines for a complete list of competencies.

Total Clinical Competencies:

After completing a minimum number *(e.g., two)* of Level 5 (Performed Independently) repetitions of a specific examination under direct supervision on a patient, the student may request to be evaluated on that specific examination. The evaluation form for this is the "Competency Evaluation" section in Trajecsys and is to be filled out by the Clinical Preceptor, Program Director / Education Coordinator or any credentialed technologist. Successful completion of a Competency exam **does not** qualify a student to perform that particular examination under indirect supervision.

Each clinical competency evaluation is worth from 0 to 100 points. These evaluations carry a weighted average of 30% towards the clinic grade. Nine (9) total Clinical Competencies are due at the mid-term of the semester. Nine (9) additional Clinical Competencies are due at the end of the semester, for a total of eighteen (18). The complete list of "Clinical Competencies" is located on Trajecsys and the Clinical Guidelines form.

Comprehensive Evaluations:

Prior to mid-term and at the end of the Semester I, the Program Director / Education Coordinator will select an exam for the student to complete as a comprehensive assessment. "Comprehensive Exams" are selected from those exams in which the student has already completed a Competency Evaluation. Each "Comprehensive Exam" is a percentage determination with the average of all "Comprehensive Exams" having a weighted value of 15% towards the clinic grade. A minimum of 86% is needed to successfully pass each Comprehensive Exam.

2022-2023 MRI Education Clinic Guidelines

The 1st week of rotation on a new scanner should be getting familiar with the scanning area by getting patients, screening them, giving IV's, learning about how to manipulate the controls of the scanner and which coils to use. You will be given a Clinical Orientation Checklist to complete during this week. After you complete the checklist, you can start learning how to scan on your new scanner.

The Clinical Preceptor will be the main technologist doing your graded Competencies and the Program Director/Education Coordinator will assist the Clinical Preceptor with your Comprehensive Exams at Midterm and Finals. However, the staff techs (Clinical Instructors) may also grade you on Competencies or Comprehensives. Also, the staff techs or the Clinical Preceptor will primarily do the check-off/repetitions.

Listed below are competencies (Mandatory, Elective, and Others) to choose from and complete a total of 9 at mid-term of each semester and a total of 36 competencies by the end of the year (19 ARRT Mandatory + 11 ARRT Elective + 6 more from additional Electives or Other Comps).

Mandatory Competencies are worth 20% & Total Competencies are worth 30% of your overall clinic grade.

- **19 ARRT Mandatory Competencies**
  - Brain
  - IACs
  - Pituitary
  - Vascular Head MRA (Intra)
  - Vascular Neck (Extra)
  - Cervical
  - Thoracic
  - Lumbar
  - Liver
  - MRCP
  - Shoulder
  - Wrist
  - Hip
  - Knee
  - Ankle
  - Foot (Hindfoot / Midfoot / Forefoot)
  - Image Post-Processing (MIP Reformation, MPR, Subtraction)
  - ACR Weekly QA/QC
  - Daily QA/QC
- **Any 11 ARRT Elective Competencies**
  - Orbits
  - Cranial Nerves (Non-IACs)
  - Vascular Head (MRV)
  - Brain Perfusion
  - Brain Spectroscopy
  - Soft Tissue Neck
  - Trauma Spine
  - Sacrum-Coccyx
  - Sacroiliac (SI) Joints
  - Brachial Plexus
  - Chest (Non-Cardiac)
  - Breast
  - Vascular Thorax
  - Pancreas
  - Adrenals
  - Kidneys
  - Enterography
  - Female Soft Tissue Pelvis (Uterus)
  - Male Soft Tissue Pelvis (Prostate)
  - TMJs
  - SC Joints
  - Long Bones (Upper Extremity)
  - Elbow
  - Hand
  - Finger/Thumb
  - Bony Pelvis
  - Long Bones (Lower Extremity)
  - Arthrogram
  - CINE (CSF Flow Study, TMJs)
- **Other Competencies**
  - WVUH Brain / IAC Post-Processing
  - Cardiac (Morph/Function/Perf)
  - fMRI
  - Gamma Knife
  - Scapula
  - Thoraco-Lumbar
  - Send to PACS
  - Verify/Complete Exam in PACS
  - EPIC Documentation
  - Perfusion Vitrea Post-Processing
  - DTI Post Processing

West Virginia University Hospitals
Imaging Science Education Programs / MRI

Clinical MRI - MRIT 410 - Semester I
Flowsheet

Name: John Doe **Semester:** Fall 2022 (Final) **Grade:** 92.71%

Max points = 5
Clinical Preceptor Points (Wt. Avg. 10%) 4.73 **Student #** 1

Orientation Checklists (Wt. Avg. 10%) and Evaluations (Wt. Avg. 10%)

Clinical Area	Rotation	O.C.	Evaluation	Tech Eval.
HSC Aera Week 1	1	1	4	1
HSC Aera Week 2	1		0	0
Ruby 1.5 Week 1	1	1	4.3	1
Ruby 1.5 Week 2	1		4	1
Ruby 3T Week 1	1	1	4	0
Ruby 3T Week 2	1		4.6	1
POC Aera Week 1	1	1	4	0
POC Aera Week 2	1		5	1
POC GE Week 1	1	1	4.6	1
POC GE Week 2	1		4.2	0
UTC Week 1	1	1	5	1
UTC Week 2	1		5	1
RNI Week 1	1	1	4.8	1
RNI Week 2	1		5	1
HSC Aera Week 1	2		5	0
HSC Aera Week 2	2		0	1
Ruby 1.5 Week 1	2		0	0
Ruby 1.5 Week 2	2		4	0
Ruby 3T Week 1	2			
Ruby 3T Week 2	2			
POC Aera Week 1	2		4.8	1
POC Aera Week 2	2		5	1
POC GE Week 1	2		0	0
POC GE Week 2	2		4.6	1
UTC Week 1	2			
UTC Week 2	2			
RNI Week 1	2			
RNI Week 2	2			
UTC Week 1	3			
UTC Week 2	3			
HSC Aera Week 1	3			
HSC Aera Week 2	3			
Ruby 3T Week 1	3			
Ruby 3T Week 2	3			
Ruby 1.5 Week 1	3			
Ruby 1.5 Week 2	3			
POC Aera Week 1	3			
POC Aera Week 2	3			
POC GE Week 1	3			
POC GE Week 2	3			
RNI Week 1	3			
RNI Week 2	3			

Clinical Competencies (Wt. Avg. 30%) and Mandatory Competencies (Wt. Avg. 20%)

	Clin. Comp	Mand. Comp.	
Head & Neck			Notes
Brain	100	1	9/2/2022
IACs	97	1	11/18/2022
Pituitary	98	1	10/5/2022
Orbits			
Cranial Nerves (Non IACs)			
Vascular Head MRA (Intra)			
Vascular Head MRV			
Brain Perfusion	100		10/1/2022
Brain Spectroscopy			
Soft Tissue Neck			
Vascular Neck (Extra)			
Spine			Notes
Cervical	100	1	8/25/2022
Thoracic			
Lumbar	95	1	9/2/2022
Trauma Spine			
Sacrum-Coccyx			
Sacroiliac (SI) Joints			
Brachial Plexus			
Thoraco-Lumbar			
Thorax			Notes
Chest (Non Cardiac)			
Breast	100		11/30/2022
MRA Thoracic			
ABD & Pelvis			Notes
Liver			
Pancreas			
MRCP			
Adrenals			
Kidneys			
Enterography			
Vascular Abdomen (MRA Renals, etc.)			
Female Soft Tissue Pelvis (e.g., Uterus)			
Male Soft Tissue Pelvis (e.g., Prostate)			
MSK			Notes
Temporomandibular Joints (TMJs)			
Sternum / SC Joints			
Shoulder	89	1	12/2/2022
Long Bones (Upper Extremity)			
Elbow			
Wrist			
Hand			
Finger / Thumb			
Bony Pelvis			
Hip			
Long Bones (Lower Extremity)			
Knee	96	1	9/12/2022
Ankle			
Foot (Hindfoot/Midfoot/Forefoot)			
Arthrogram			
Scapula			

Additional Imaging Procedures			Notes
WVUH Brain / IAC Post-processing	**98**		11/18/2022
Cardiac (Morph./Func. Or Perf.)			
CINE (e.g., CSF Flow Study, TMJs)	**100**		9/1/2022
DTI Post-processing	**100**		9/2/2022
EPIC Documentation	**100**		8/1/2022
Extremity MRA / Run-off			
fMRI			
Gamma Knife			
Image Post-processing			
(MIP Reformation, MPR, Subtraction)			
Perfusion Vitrea Post-processing	**98**		8/26/2022
Send to PACS	**100**		8/27/2022
Verify/Complete Exam in PACS	**100**		8/28/2022
Daily QA/QC			
ACR Weekly QA/QC			

Comprehensive Examinations (Wt. Avg. 15%)

	Date	Exam	Grade
Examination #1	9/28/2022	Brain	**97%**
Examination #2	12/9/2022	Lumbar	**100%**

FOR INSTRUCTOR USE ONLY

Cumulative Completion Data as of Date: 12/16/2022

Total Comp. Completed	Mand. Comp. Completed
16	7

Enter # required to-date (do not enter points)

Performance Checklist	7
Evaluations	22
ARRT Mandatory Competencies	7
Total Clinical Competencies	18
Comprehensive Examinations	2

West Virginia University Hospitals
Imaging Science Education Programs / MRI
Clinical Grade Calculation

Name: John Doe **Semester:** Fall 2022 (Final) **Date:** December 16, 2022

	Points Achieved		Total Points		Percentage		% Weight		Weighted % Average
Clinical Preceptor Points	4.73	out of	5	=	95%	x	10%	=	9.5%
Orientation Checklists	7	out of	7	=	100%	x	10%	=	10.0%
Evaluations	95.9	out of	132	=	73%	x	10%	=	7.3%
ARRT Mandatory Competencies	7	out of	7	=	100%	x	20%	=	20.0%
Total Clinical Competencies	1571	out of	1800	=	87%	x	30%	=	26.2%
Comprehensive Exams					99%	x	15%	=	14.8%
Daily Log Sheets					100%	x	5%	=	5.0%

John Doe 's grade is based on the completion of:

22 weeks of clinical rotations to-date / semester.

7 of 7 mandatory competencies.

16 of 18 total clinical competencies.

Percent Grade = 92.71%

Letter Grade = B

Comments:

Instructor's Signature: _____

Student's Signature: _____ Date: _____

Grading Scale:

93% -100% =	A
86% - 92% =	B
78% - 85% =	C
70% - 77% =	D
<70% =	F

WVU Medicine

Imaging Science Education Programs

MRI

Student: Student

Clinical Preceptor Points Evaluation

	Sem I Mid-Term	Sem I End	Sem II Mid-Term	Sem II End
Quality of Work	4	4		
Knowledge and Care of Equipment	4	5		
Ability to Follow Directions	5	5		
Contribution to Department Workload	4	5		
Initiative	3	4		
Punctuality & Attendance (Documentation)	3	4		
Appearance	5	5		
Professional Demeanor	5	5		
Cooperation and Teamwork	5	5		
Attitude Toward Criticism	5	5		
Ethical Reasoning	5	5		
Relationship with Instructors and Staff	4	5		
Attitude Toward Profession	5	5		
Handles Stressful Situations	4	4		
Completed all Clinical Instructor Evaluations	5	5		
TOTAL	4.40	4.73	0.00	0.00

	(1-5 points)
Scale:	**1** = Unsatisfactory **2** = Needs Improvement **3** = Average **4** = Above Average **5** = Excellent

WVUH MRI Education Program

MRI Safety Requirements Competency Form

Student: _____ **Date:** _____

Evaluation Instructions

Using the scale below, assign a number score to each of the MRI Safety Requirements based on the student's performance of each task. The student must score at least a 4 to pass each requirement.

Scale:		
	1 -	**Unsatisfactory** (Failed to perform task correctly)
	2 -	**Major Error** (Maximum correction or assistance required / prompting)
	3 -	**Moderate Error** (Moderate correction or assistance / prompting)
	4 -	**Minor Error** (Minimal correction or assistance required / acceptable task performance)
	5 -	**No Error** (No correction or assistance required)

	MRI Safety Requirements	Date Completed	Competence Verified By
Score:	**Screening Patients, Personnel, and Non-Personnel for MR safe, MR Conditional, and MR Unsafe Devices and Objects**		
Score:	**Identify MRI Safety Zones**		
Score:	**Static Magnetic Field** (e.g., Projectiles, Translational & Rotational Forces)		
Score:	**Radiofrequency Field** (e.g., Thermal Heating [SAR], Coil Positioning, Patient Positioning, and Insulation)		
Score:	**Time-varying Gradient Magnetic Fields** (e.g., Induced Voltages & Auditory Considerations)		
Score:	**Communication and Monitoring Considerations** (e.g., Sedated Patients, Verbal and Visual Contact, Vital Signs)		
Score:	**Contrast Media Safety** (e.g., NSF, Renal Function)		
Score:	**Other MRI Safety Considerations** (e.g., Cryogen Safety, Fire, Medical Emergencies, Laser Alignment Lights)		

**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.*

_____

Evaluator Signature/Date

_____

Student Signature/Date

_____

Clinical Preceptor or Program Director Signature/Date

Magnetic Resonance Imaging

1. Introduction

Candidates applying for certification and registration under the primary eligibility pathway are required to meet the Professional Education Requirements specified in the *ARRT Rules and Regulations*. ARRT's *Magnetic Resonance Imaging Didactic and Clinical Competency Requirements* are one component of the Professional Education Requirements.

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 which is used to develop the clinical competency requirements (see section 4 below) and the content specifications which serve as the foundation for the didactic competency requirements (see section 3 below) and the examination.

2. Documentation of Compliance

To document that the Didactic and Clinical Competency Requirements have been satisfied by a candidate, the program director (and authorized faculty member if required) must sign the ENDORSEMENT SECTION of the *Application for Certification and Registration* included in the *Primary Eligibility Pathway Handbook*.

Candidates who complete their educational program during 2020 or 2021 may use either the 2017 Didactic and Clinical Competency Requirements or the 2020 requirements. Candidates who graduate after December 31, 2021 must use the 2020 requirements.

3. Didactic Competency Requirements

The purpose of the didactic competency requirements is to verify that individuals had the opportunity to develop fundamental knowledge, integrate theory into practice and hone affective and critical thinking skills required to demonstrate professional competency. Candidates must successfully complete coursework addressing the topics listed in the ARRT Content Specifications for the MRI examination. These topics would typically be covered in a nationally-recognized curricula published by organizations such as the ASRT or SMRT. Educational programs accredited by a mechanism acceptable to ARRT generally offer education and experience beyond the minimum requirements specified in the content specifications and clinical competency documents.

4. Clinical Competency Requirements

The purpose of the clinical competency requirements is to verify that individuals certified and registered by the ARRT have demonstrated competency performing the clinical activities fundamental to a particular discipline. Competent performance of these fundamental activities, in conjunction with mastery of the knowledge and cognitive skills covered by the MRI examination, provides the basis for the acquisition of the full range of procedures typically required in a variety of settings. Demonstration of clinical competence means that candidates have performed the procedures independently, consistently, and effectively during their formal education. The following pages identify the specific procedures for the clinical competency requirements. Candidates may wish to use these pages, or their equivalent, to record completion of the requirements. The pages do NOT need to be sent to the ARRT.

4.1 General Performance Considerations

4.1.1 Patient Diversity

Demonstration of competence should include variations in patient characteristics such as age, gender, and medical condition.

4.1.2 Simulated Performance

The ARRT requirements specify that general patient care procedures may be simulated as designated in the specific requirements below. Simulations must meet the following criteria:

- The candidate must competently demonstrate skills as similar as circumstances permit to the cognitive, psychomotor, and affective skills required for performing the procedures on patients;
- The program director must be confident that the skills required to competently perform the simulated task will generalize or transfer to the clinical setting, and, if applicable, the candidate must evaluate related images.

Examples of acceptable simulation include: demonstrating CPR on a mannequin; performing venipuncture by demonstrating aseptic technique on another person, but then inserting the needle into an artificial forearm or grapefruit.

4.1.3 Elements of Competence

Demonstration of clinical competence requires that the program director or the program director's designee has observed the candidate performing the procedure independently, consistently, and effectively during the course of the candidate's formal educational program.

4.2 Magnetic Resonance Imaging Specific Requirements

As part of the education program, candidates must demonstrate competence in the clinical procedures identified below. These clinical procedures are listed in more detail in the following sections.

- Seven mandatory general patient care procedures
- Eight mandatory MRI safety requirements
- 17 mandatory MR imaging procedures
- 11 of the 30 elective MR imaging procedures and
- Seven mandatory MRI quality control procedures

4.2.1 General Patient Care Procedures

Candidates must have demonstrated competence in all seven patient care procedures listed below. The procedures should be performed on patients whenever possible, but simulation is acceptable if state or institutional regulations prohibit candidates from performing the procedures on patients.

General Patient Care Procedures	Date Completed	Competence Verified By
CPR		
Vital Signs (Blood Pressure, Pulse, Respiration)		
Sterile Technique		
Standard Precautions		
Transfer of Patient		
Care of Patient Medical Equipment (e.g., Oxygen Tank, IV Tubing)		
Venipuncture		

4.2.2 MRI Safety Requirements

Candidates must demonstrate competence in all eight areas of MRI Safety listed below.

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 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., Inducted Voltages, 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)		

* 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.

4.2.3 MR Imaging Procedures

Candidates must demonstrate competence in the 17 mandatory procedures listed on the following page. For the mandatory procedures, candidates must be evaluated while scanning actual patients. Candidates are also required to demonstrate competence for 11 of the 30 elective procedures. Elective procedures should be performed on patients; however, up to five of the elective procedures may be performed on volunteers, as long as your institution has a policy that assures the protection of both the volunteer's and the institution's interests.

When performing the MR imaging procedures, 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 post-procedure instructions

Technical and procedural skills including:

- selection of optimal imaging coil
- patient positioning
- protocol selection
- parameter selection
- image display, networking, and archiving
- post-processing
- documentation of procedure and patient data in appropriate records
- completion of acquisition

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

4.2.3 MR Imaging Procedures (continued)

Head and Neck	Mandatory	Elective	Date Completed	Patient or Volunteer	Competence Verified By
Brain	✓			Patient	
IACs	✓			Patient	
Pituitary	✓			Patient	
Orbits		✓			
Cranial Nerves (Non IACs)		✓			
Vascular Head MRA	✓			Patient	
Vascular Head MRV		✓			
Brain Perfusion		✓			
Brain Spectroscopy		✓			
Soft Tissue Neck		✓			
Vascular Neck	✓			Patient	
Spine					
Cervical	✓			Patient	
Thoracic	✓			Patient	
Lumbar	✓			Patient	
Spinal Trauma		✓			
Sacrum-Coccyx		✓			
Sacroiliac (SI) Joints		✓			
Brachial Plexus		✓			
Thorax					
Chest (Non Cardiac)		✓			
Breast		✓			
Vascular Thorax		✓			
Abdomen and Pelvis					
Liver	✓			Patient	
Pancreas		✓			
MRCP	✓			Patient	
Adrenals		✓			
Kidneys		✓			
Enterography		✓			
Vascular Abdomen		✓			
Female Soft Tissue Pelvis (e.g., Uterus)		✓			
Male Soft Tissue Pelvis (e.g., Prostate)		✓			

4.2.3 MR Imaging Procedures (continued)

Musculoskeletal	Mandatory	Elective	Date Completed	Patient or Volunteer	Competence Verified By
Temporomandibular Joints (TMJs)		✓			
Sternum/Sternoclavicular (SC) Joints		✓			
Shoulder	✓			Patient	
Long Bones (Upper Extremity)		✓			
Elbow		✓			
Wrist	✓			Patient	
Hand		✓			
Finger/Thumb		✓			
Bony Pelvis		✓			
Hip	✓			Patient	
Long Bones (Lower Extremity)		✓			
Knee	✓			Patient	
Ankle	✓			Patient	
Foot	✓			Patient	
Arthrogram		✓			
Additional Imaging Procedures					
Image Post-Processing (MIP Reformation, MPR, Subtraction)	✓				
CINE (e.g., CSF Flow Study, TMJs)		✓			

4.2.4 MRI Quality Control Procedures

Candidates must demonstrate competence in the seven quality control activities listed below. The first four procedures are performed on a QC phantom.

MRI Quality Control Procedures	Date Completed	Competence Verified By
Signal to Noise Ratio		
Center Frequency		
Transmitter Gain or Attenuation		
Geometric Accuracy		
Equipment Inspection (e.g., Coils, Cables, Door Seals)		
Monitor Cryogen Levels		
Room Temperature and Humidity		

Policy No.	**2.015**
Effective:	5/2019
Reviewed:	1/2022
Revised :	12/2021

Simulated Exam Policy

The West Virginia University Hospitals (WVUH) Magnetic Resonance Imaging (MRI) Education Program conducts simulated exams in a controlled laboratory setting under the supervision of the Clinical Preceptor, Program Director, or Clinical Instructor. Simulated exams are incorporated into the curriculum as a mechanism for developing psychomotor skills and clinical scanning techniques in a simulated patient environment. Volunteer imaging subjects are utilized and may include students and/or other members of the general population. Simulated exams are conducted for educational purposes only and are non-diagnostic. Student participation as an imaging subject is voluntary and is governed by the following:

Procedure

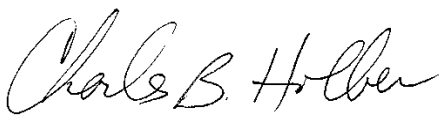
1. During orientation, the Program Director will review this policy and provide students with an information sheet describing the simulated exam procedure and specifics regarding participation and the anatomical areas generally imaged.

2. The Program Director will explain to the students that participation as an imaging subject is strictly on a voluntary basis and that refusal to participate will not affect the student's clinical grade and/or evaluations.

3. Students will be given the opportunity to discuss any concerns, questions, and/or reservations they may have regarding the simulated exam procedure and their potential participation as an imaging subject.

4. Students will be asked to complete the attached form reflecting their decision regarding their level of participation. A copy will be retained as part of the student educational record.

5. Students will be advised that during their participation as an imaging subject, should a situation arise in which they feel uncomfortable, they reserve the right decline participation regardless of their indicated choice on the attached authorization form.



MRI Education Program Director

Policy No. 2.015a
Effective: 5/2019
Reviewed: 1/2022
Revised: 1/2022

Policy for Incidental Medical Findings During Simulated MRI Exams

The images produced during simulated MRI exams are not sufficient for diagnostic purposes. At times, however, abnormalities in such images can be observed by the technologist(s) performing the studies. In such cases, the policy of the WVUH MRI Education Program is the following:

1) **Review of Imaging Data:** When a possible abnormality is first observed, contact an appropriately trained medical professional, and have him/her come to examine the images. This should be done as soon as possible; prior to the volunteer leaving the facility whenever feasible. If image review must be conducted after the volunteer leaves the facility, do not comment on the potential finding to the volunteer yourself.

2) **Informing the Subject:** If, after review of the images, it is determined that an anomaly exists, an appropriately trained medical professional should discuss the finding with the volunteer. Ideally, this would be done before the volunteer leaves the facility. If that is not possible, a direct contact should be made with the volunteer as quickly and efficiently as possible, and without alarming the volunteer any more than is necessary. Discussion with the volunteer may include recommendations for follow-up, further evaluation, and addressing the volunteer's questions. After this discussion, the appropriately trained medical professional should reiterate the findings and information in a written letter to the subject in a timely fashion.

3) **Sharing Imaging Information:** While the images obtained may not be appropriate for diagnostic purposes, they may be informative in further follow-up. It should be made clear in any communication with the volunteer that an appropriately trained medical professional will be available for further questions and will provide information to the subject's physician. In addition, this notification is the extent of WVUH's responsibility in the matter.

MRI Education Program Director

WVU Medicine
IMAGING SCIENCE EDUCATION PROGRAMS
MRI

West Virginia University Hospitals
Medical Center Drive
Morgantown, WV 26506

Simulating MRI Procedures

Information sheet to be reviewed by volunteer for simulated MRI examination.

Thank you for considering participation in this simulated exam. The information below is to help you decide whether or not you wish to proceed with the MRI.

Why are we doing this simulation?

MRI offers a safe and effective way of seeing what is beneath the skin surface. MRI can show you what lies inside our bodies, but the images are not initially easy to understand for the students. Also, setting up the examination and positioning the patient are extremely important to get the proper images for the radiologist. Hence, why the more experience a student receives; the easier these procedures will be to perform.

How will the simulation be organized?

With permission of the volunteer, a MRI student will begin the scan under the supervision of the Clinical Preceptor, Program Director, or Clinical Instructor. The student will be practicing the normal protocol imaging that is required for each organ or study. Please remember that this is a Non-Diagnostic & Non-Contrast study.

Is it safe?

MRI has been widely used in clinical practice for over 30 years and the consensus is that there are no known long-term adverse biological effects of extended exposure to the magnetic fields used in MRI.

It is recognized that some very intensive MRI sequences could produce heating in the tissues, which carries a theoretical risk to sensitive tissues, particularly the fetus. Because of this, there are strict guidelines that limit the amount of RF and gradient power that can be used by the MRI scanner. Our MRI equipment (Siemens Avanto, Siemens Aera, Siemens Verio, and GE Discovery) operate well within or below these guidelines.

In conclusion, through constant research, current data indicates that there are no confirmed biological effects on patients and their fetuses exposed to the prudent use of MRI.

Continued on next page

What will volunteers have to do?

First, read and understand the information sheet and ask any further questions you may have. If you decide to offer yourself as a volunteer, we will ask you to sign the attached consent form.

Also, all volunteers will need to change into scrubs and fill out an MRI screening form to ensure their safety in MRI Zones III and IV.

The simulation will concentrate on patient and coil positioning, exam protocol selection, parameter settings / manipulation, slice positioning, and image acquisition / display.

What happens if I change my mind about taking part?

You can withdraw from the simulated exam as a volunteer without disadvantage to yourself of any kind (this is a standard condition of informed consent).

Will any information about me collected or preserved?

No identifiable information will be collected from volunteers. If your examination provides a particularly good view that might be useful for teaching, we may ask you if we can preserve it in an anonymized form. This will not be done without your consent. Such images will only be used for teaching in procedures, anatomy, or pathology classes.

If in the unlikely event that something is detected, which would need preserving in the interests of your own health (see below), this will be done only with your consent.

What happens if something unexpected is found?

On rare occasions, there is an unexpected finding which may require further investigation. If this should occur, you will be informed and we will offer to assist in finding an appropriate medical service. However, it is ultimately your responsibility to seek appropriate medical services.

Should something unexpected be found, every attempt will be made to ensure that the other members of the student group are not aware of it. However, you should appreciate that this may not be always possible, depending on the circumstances under which the finding is made.

For further information, please contact the Program Director at 304-598-4169

Simulated Exam Authorization Form for MRI Students

I, _____, as a student enrolled in the West Virginia University Hospitals MRI Education Program acknowledge the following:

1. I have received a copy of the Simulated Exam Policy.

2. I understand the procedures and practices inherent in simulated exams and the essential use of imaging subjects in the clinical education process.

3. I have been given the opportunity to ask questions and seek clarification on all aspects relative to the simulated exam and my voluntary participation as an imaging subject.

4. I understand that my participation as an imaging subject is strictly voluntary and that my refusal to participate does not negatively affect my clinical grades and/or evaluations.

5. I understand should a situation arise in which I feel uncomfortable, I reserve the right to decline participation regardless of my indicated choice on this authorization form.

Therefore, in consideration of the aforementioned criteria:

☐ I agree to voluntarily participate as an imaging subject during simulated exams while I am enrolled in the MRI program at WVUH with no exceptions.

☐ I agree to voluntarily participate as an imaging subject during simulated exams while I am enrolled in the MRI program at WVUH with the following exceptions.
Please list:
_____
_____
_____

☐ I do not wish to participate as an imaging subject during simulated exams while I am enrolled in the MRI program at WVUH.

Student Signature: _____ Date:_____