Kingdom of Saudi Arabia
Ministry of Education
King Abdulaziz University
Faculty of Applied Medical Sciences
Department of Radiological Sciences

Internship Logbook

2022 – 2023

Radiological Sciences Program

Student Name	
Student ID	

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Introduction

The program of the Diagnostic Radiography Technology is designed to require students to undergo a full extensive year of hospital training after completing their 4th year. The Internship year provides students with the skills they need to ease the transition from being a student to becoming a professional radiologic technologist. This is achieved by exposing the students to new technology, teaching them the proper way for dealing with patients, and developing their teamwork skills.

The major student activities in this year:

- Read request form, receive patient, chick patient ID, and preparation
- Introduce themselves and explain the procedure to the patient, take consent form if needed, prepare the room, equipment, accessories and supplies.
- Select the proper technique, position the patient for the requested examination, give appropriate instructions to patient select appropriate technical parameters, radiation protection and take diagnostic images.
- Process the image, critique the image for acceptability or rejection with radiologic technologist
- Inform the patient that the examination is finished and tell about after care if needed and the collection of report.
- Upload the images to the system and maintains the record of the procedures.
- Record details of examination in the clinical logbook and are initialed by the supervising technologist.

Internship Learning Outcomes

Knowledge
Recognize the role of a radiologic technologist in different imaging modalities regarding patient positioning, patient care, imaging techniques, documentation requirements and radiation protection for self, staff and patient.
Identify and describe anatomy and pathology in different medical imaging.
Cognitive Skills
Able to solve technical, ethical and clinical problems.
Recognize and respond immediately to emergencies.
Make decisions to enhance patient comfort and safety during procedures.
Interpersonal Skills & Responsibility
Demonstrate the ability to deliver an accurate instructions and explanation at an appropriate level that patient can understand.
Instruct and inform others about radiation safety.
Communication, Information Technology, Numerical
Demonstrate teamwork while conducting imaging procedures.
Utilize oral and written communication effectively.
Demonstrate computer skills and how to deal with Hospital Information System (HIS), Radiology Information System (RIS), and Picture Archiving Communication System (PACS).
Psychomotor
Demonstrate the ability to manipulate and operate different diagnostic equipment safely and efficiently for each clinical situation.

General rules according to the FAMS Clinical Affairs

The intern should consider the following points:

- Attend the internship orientation arranged by faculty during fourth year.
- Begin internship training in August Gregorian calendar (date is confirmed annually).
- Attend the orientation at the beginning of training at the hospital.
- Follow the rules and regulations of the hospital where the training is taking place.
- Keep patient's information confidential and use it strictly within the work environment.
- Follow the official duty hours of the hospital (full-time).
- Notify the Office for Clinical Affairs of any problems during training.
- Not start an official job before completing the full internship year.

Training Centers (hospitals)

- All the Ministry of Health (MOH), Military, and National Guards Hospital inside the kingdom are subjected to the availability (Table attached).
- Training outside the kingdom is subjected to the request from the intern and has to be approved by internship committee.
- Applying for training has to be through sending letters to the training centers depending on communications or previous agreements if available.

Holidays

- Public holidays are allowed automatically according to official announcements (as working hospital staff)
- Interns are not entitled for Academic holidays (mid-term breaks etc.).
- All leaves must be formally requested using the Holiday Application Form and are approved directly by the supervisor with faculty notification (except for Educational Leaves).
- The allowed number (holiday credit) expires by the end of each training period (<u>no credit accumulation is allowed).</u>

Interns are allowed for the following leaves:

- Regular **12** days: **6** emergency days, and **6** sick days (sick leave: compensation required for > **3** days, and a medical report is required).
- Educational leave: **10** days is allowed annually to attend conferences, workshops related to the field or exams. Leave credit must first be confirmed from faculty (form can be sent by email).

Maternity Leave:

A pregnant intern (close to delivery) may request **a 30-day maternity leave** without compensation. The intern must pre-arrange the leave with the faculty and supervisor.

Important note:

Interns that are absent without excuse or repetitively late for work are subject to deduction of leave allowance (or termination of training), based on the supervisor's report at training site. Training supervisors can notify the faculty about cases of repetitive absences and noncompliance with duty hours.

Postponing:

Interns may request to postpone (suspend) their training with the following considerations:

- Postponing results in delay of graduation, and the intern should adjust accordingly.
- Postponing the internship training must not be less than one whole training period.
- Only one postponement is allowed during the internship year (with a valid reason).
- If the request was approved by faculty, the intern must contact the faculty one month before commencing the training to confirm the modified training plan and financial matters.
- The intern must compensate the postponed period during the next academic year at the available training slots, after giving priority to new interns.

Changes:

- Interns must follow the rotation schedule (plan) approved by the faculty and sign the designated form.
- No request for plan changes will be considered, unless special circumstances apply.
- Any change in the training plan without official approval from the faculty will not be accepted; instead, the rotation in question will be nullified and must be repeated.

Evaluation:

- The Intern's performance will be assessed in each training period by the supervisor.
- The evaluation form is then approved by the training coordinator at the hospital and sent to the faculty (electronically or hard-copy).
- Evaluation forms brought to the faculty by interns will not be accepted unless the forms are delivered in an officially sealed envelope or by email.
- Final grades for the intern evaluation for a training period will be assigned using either pass (minimum of 60%) or fail (less than 60%).
- Interns with less than 60% in their evaluations will be required to repeat all or part of the training experience as set by the Internship Committee.

Before the internship year

- Students should pass all the Pre-Requisite Requirements.
- Students should have the BLS certificate.
- Students should perform blood work check-up/ and have the required vaccination.
- Students should attend the orientation day which includes important rules and regulations for the internship year, internship period dates, evaluation forms, vacations, and dress code.
- Students should have personal radiation monitory devices (TLDs/OSL).
- Students should have their hospital ID card.

Clinical Rotations and the number of required cases

S#	Imaging modality	The range number of required cases	Type of practice	Period	Instructions
1.	X-ray Fluoroscopy Diagnostic and interventional radiology Mammography	250-300	Compulsory	3 Months	- In general radiography area, students are obligated to do between 250 and 300 cases independently. These cases can be a mixture of different modalities including X-ray, fluoroscopy, diagnostic and interventional radiology, and mammography.
2.	Computed tomography (CT)	140-200	Elective	3 Months	- For CT modality, students are obligated to do between 140 and 200 cases independently. These cases must be variable (for different body parts) and have different protocols (with contrast media or without contrast media)
3.	Magnetic resonance imaging (MRI)	140-200	Elective	3 Months	- For MRI modality, students are obligated to do between 140 and 200 cases independently. These cases must be variable (for different body parts) and have different protocols (with contrast media or without contrast media)
4.	Nuclear medicine (NM)	140-200	Elective	3 Months	- For NM modality, students are obligated to do between 140 and 200 cases independently. These cases must be variable (for different body parts)
5.	Ultrasound (US)	140-200	Elective	3 Months	- For US modality, students are obligated to do between 140 and 200 cases independently. These cases must be variable (for different body parts)

Important Notes

- Students must have a rotation in the general radiography area for 3 months as a minimum (see the table above) to complete the required number of cases for this area.
- Students are required to select three elective modalities from the table after completing the compulsory rotation in general radiography.
- Students who have an interest in **radiotherapy (optional)** may have rotation there if the permission from a senior supervisor is obtained and the number of cases in the assigned area (CT, MRI, US, NM, or GR) are completed.

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Clinical evaluation criteria and marks

Categories		Marks	Comments
Attendance	**Student routinely presents and is punctual in assigned clinical area**	**10**	
Communication skills	**Student interacts appropriately and professionally with staff** **Student interacts appropriately and professionally with patient**	**5**	
Attitude	**Student is willing to be guided, directed and instructed by staff**	**5**	
Professionalism	**Student's appearance and behavior are consistent with the hospital rules and regulations.** **Inappropriate use of mobile phones (being preoccupied using phones during procedures times, taking photos and sharing them in social media).**	**10**	
Knowledge	**Able to identify medical terms and abbreviations.** **Interpreted radiographic images (anatomy/ pathology).**	**10**	
Critical thinking	**Able to make logical independent decision; evaluate radiographs for proper technique, positioning and professional quality.**	**10**	
Imaging procedure	**Proper use of machine. Understand the procedure (indication, contraindication, technique).** **Apply patient care (patient preparation, room preparation, patient aftercare).**	**10**	
Safety	**Safety practices related to each modality.** **Apply ALARA principle.**	**10**	
Quality	**Perform quality control test. Produce high quality image.**	**10**	
Logbook completion	**Student is working hard toward record and completing the required number of cases in the provided logbook from the university.**	**20**	
Overall Mark		**100**	

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Overview: General Radiography

General radiography is an examination that uses x-ray to reflect the composition of internal organs of the human body. It is the oldest and most commonly used form of medical imaging. X-ray is safe when it is properly used. Both radiologists and radiologic technologists are trained and skilled to minimize the amount of radiation needed for producing diagnostic images. Although general radiography encompasses a variety of modalities that have different technical and mechanical features to produce diagnostic images, all these modalities utilize ionizing radiation given to the patient in a standardized distance from the patient and based on differential absorption characteristics of the incident x-ray. These modalities include:

1. X-ray
2. Mammography
3. Fluoroscopy
4. Diagnostic and interventional angiography

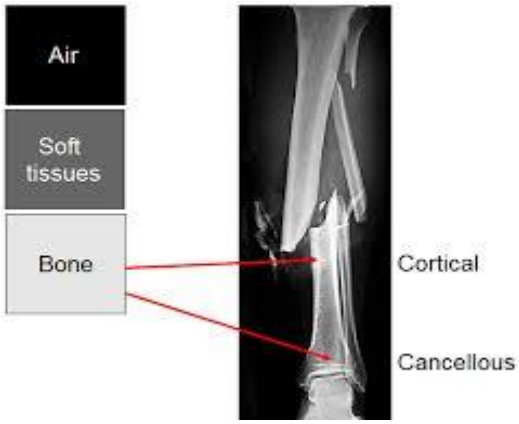
❖ Radiation protection rules for patient and radiologic technologist in general radiography:

- Radiologic technologists should apply the ALARA principle.
- Appropriate radiation protective measures including lead barriers, gonadal shield, and lead gown for all people in the x-ray area should be considered if needed.
- For female patients of childbearing age, radiologic technologists should ask the patient about the chance of being pregnant before starting a procedure.
- Radiologic technologists should check a patient's x-ray request before doing a procedure to ensure that examination is for the right person.
- Radiologic technologists should ensure that patients, relatives and staff are properly instructed before an x-ray exposure is made.
- Before making an exposure or performing a fluoroscopy, radiologic technologists should ensure that all doors are closed.
- Radiographs should not be repeated. If any doubts arise for the quality of the images (motion, incorrect positioning, artefact, etc.) consult a senior radiologic technologist first before repeating the examination.
- In the operating room, the radiologic technologist should warn everyone that he is going to do an exposure.

1. X-ray:

1.1 An overview:

X-ray is an electromagnetic radiation that can pass through the body. As they pass through the body, the energy from X-rays is absorbed at different rates by different parts of the body. A detector on the other side of the body picks up the X-rays after they've passed through and turns them into an image. Dense parts of your body that X-rays find it more difficult to pass through, such as bone, show up as clear white areas on the image. Softer parts that X-rays can pass through more easily, such as your heart and lungs, show up as darker areas.



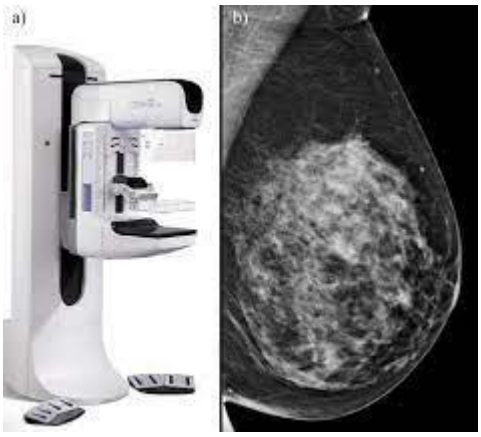
1.2 The role of radiologic technologists in x-ray:

- They are responsible for accurately positioning patients and ensuring that a quality diagnostic image is produced.
- They should coordinate with other healthcare professionals, including nurses, doctors, and other technologists, to ensure continuity of care and appropriate follow-up with patients.
- They may be required to perform basic maintenance tasks on the equipment.
- They should prepare patients for the medical imaging procedure to be done.
- They must ensure patient safety, which includes the proper positioning of the patient and limiting radiation exposure on parts of the body that do not require imaging.

2. Mammography:

2.1 *An overview:*

Mammography is a specialized x-ray equipment that uses a low radiation dose in order to see the composition of the breast. It has two plastic plates to compress breast tissues which consequently will improve the quality of image and allow less radiation to the breast area. Images produced from this modality can be used for screening purposes (detection of cancer at early stages) as well as diagnostic considerations (to diagnose masses. calcifications, and cysts). The recent development of mammography allows for improved breast imaging, particularly, in women with dense breast tissue, younger women (less than 50 years), and premenopausal as well as postmenopausal females. Digital mammography, computer-aided detection (CAD), and breast tomosynthesis are good examples for the modern developed technologies in mammography.



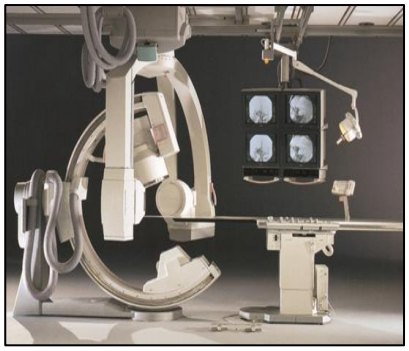
2.2 The role of radiologic technologists in mammography:

- They operate a mammographic machine to produce images of the breasts for either diagnostic or screening purposes.
- They explain the procedure to patients, position and immobilize the patient's breast in the unit.
- They observe the scanning process.
- They evaluate the quality of produced images.

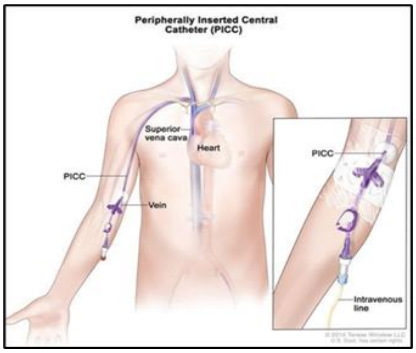
3. Diagnostic and Interventional Angiography

3.1 An overview:

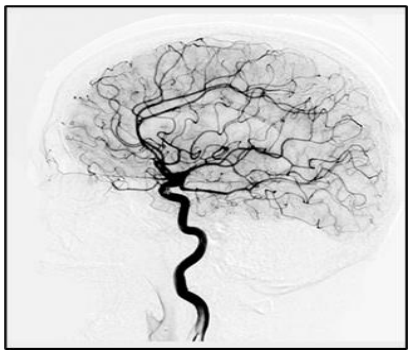
Angiography is a medical imaging technique used to visualize the blood vessels with a particular interest in the arteries, veins, and heart chambers. Angiography is performed after contrast media injection into the vessels and diagnosed using fluoroscopy. The x-ray images are taken by using the digital subtraction angiography (DSA) technique. The images are usually taken at 2 - 3 frames per second, which allows the radiologist to assess the flow of the blood via vessels. This technique helps to subtract the bones and the other organs, so only the vessels filled with contrast will appear. There are several interventional and therapeutic procedures performed in the angiography department including cerebral angiography, venogram, and angioplasty.



General angiographic room with C-arm digital imaging



Peripherally inserted central catheter (PICC)



Cerebral angiography

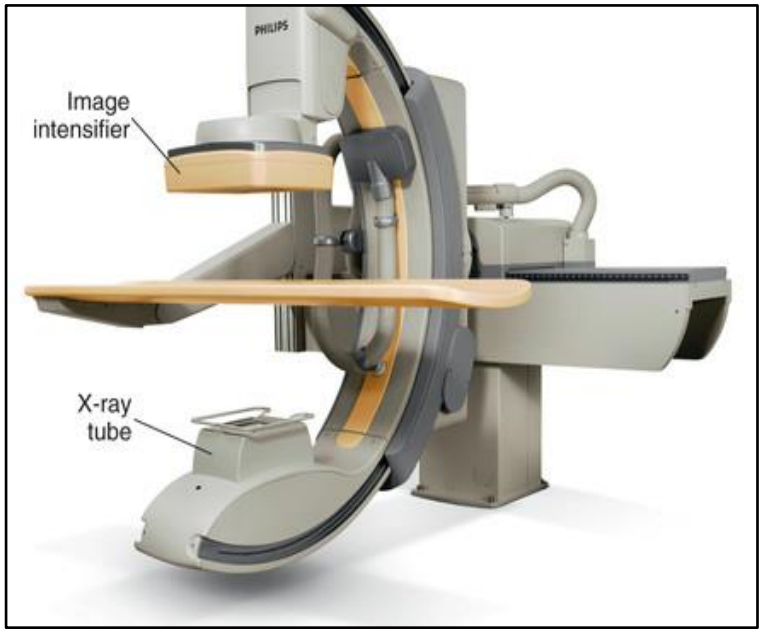
3.2 The role of radiologic technologists in diagnostic and interventional angiography:

- They prepare the diagnostic imaging equipment and materials required for the procedure, such as catheters, guidewires, and contrast media.
- They position the patient for the imaging procedure.
- They clarify the instructions of the procedure to the patients.
- They shield patients from unnecessary exposure to radiation.
- They follow the radiologist orders to assist with imaging during the procedure.
- They evaluate of captured images for accuracy.

4.Fluoroscopy:

4.1 An overview:

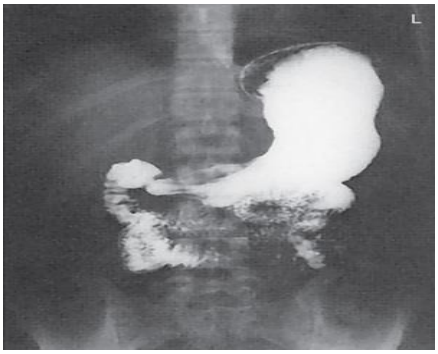
Fluoroscopy unit is a specialized x-ray machine used to produce real time moving images of internal structures of the human body to demonstrate their physiological functions. It uses X-ray technology and contrast dye material which makes the targeted body parts radio-opaque for easier visualization (see radiographs below). Fluoroscopy unit is commonly used in the diagnosis of diseases as well as interventional procedures in the field of orthopedic, gastroenterology, and cardiovascular care.



C-arm digital fluoroscopy

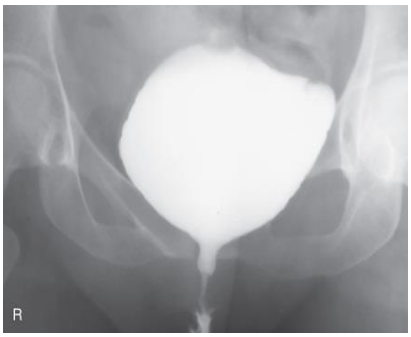
4.2 The role of radiologic technologists in fluoroscopy unit:

- They review consents, allergies & anticoagulants with the patient prior to interventional pain procedures.
- They ensure proper patient positioning: prone vs. supine, use of cervical headrest & knowledge of interventional pain procedures.
- They demonstrate proper alignment of the C-Arm for procedure for interventional pain procedures.
- They ensure patient stability status post procedure prior to mobilization.
- They perform patient transport assist from procedure table to wheelchair while monitoring fall precautions.
- They perform monitoring of radiofrequency during patient treatment course.
- They demonstrate proper knowledge of and perform proper procedures utilized with different physicians.



Upper GI image demonstrating barium in the stomach

Hysterosalpingogram



Voiding cystourethrogram

General radiography cases

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To be initiated by senior technologist (please tick one of these options)	**( )**	**Student independently performs more than 80% of the recorded cases above**
	( )	**Student independently performs more than 50% of the recorded cases above**
	( )	**Student independently performs more than 20% of the recorded cases above**
	( )	**Student independently performs less than 20% of the recorded cases above**
Comments or feedback		
Senior technologist' signature		

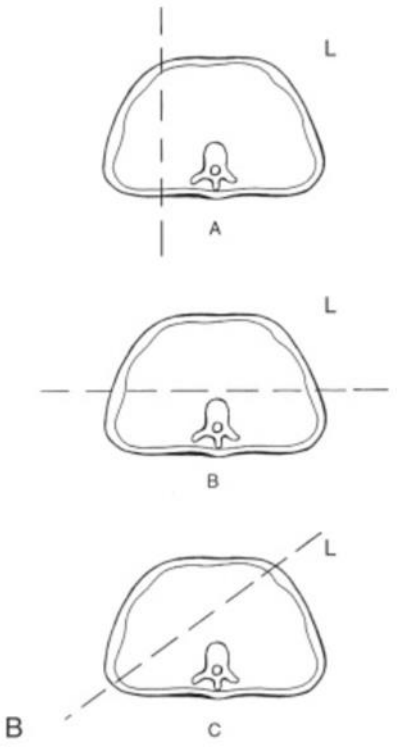
Note: This table will not be accepted unless all sections are completed, including date, name of modality, clinical indication, body part, signature, and comments.

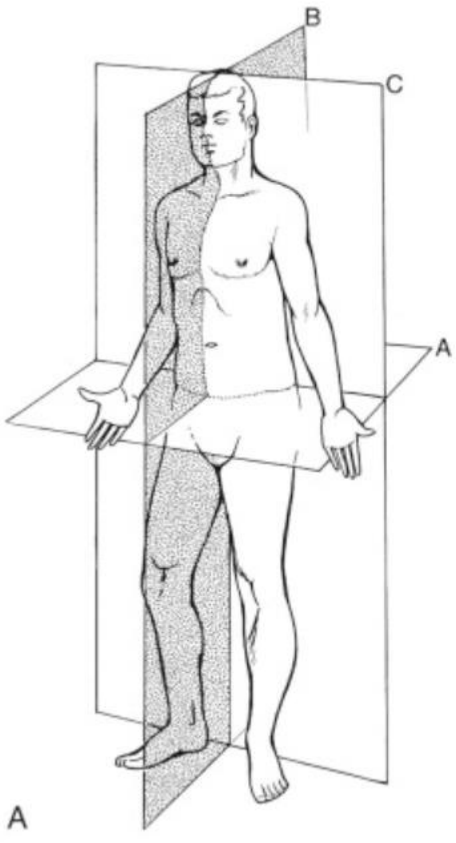
Abbreviation and Acronym	Stand for

Cross-sectional imaging

Cross-sectional imaging is any radiological imaging procedures that are capable to produce an image in the form of a plane through the body with the structures cut across. In all conventional x-ray techniques, the x-ray beam passes through the patient, superimposing all structures in its path onto an x-ray film or detector (projection image, two-dimensional image). In contrast to this conventional approach, cross-sectional scanning techniques "slice" the patient open, providing a look "inside," eliminating superimposition. These images are the product of individual digital readings, from multiple angles, synthesized into a digital image. The digital data can be processed to improve tissue contrast and brightness or to view the anatomy in various planes and in three dimensions. This technology is a main aspect of some radiological modalities such as:

1. Computed tomography (CT)
2. Magnetic resonance imaging (MRI)
3. Ultrasound (US)
4. Nuclear medicine (NM)



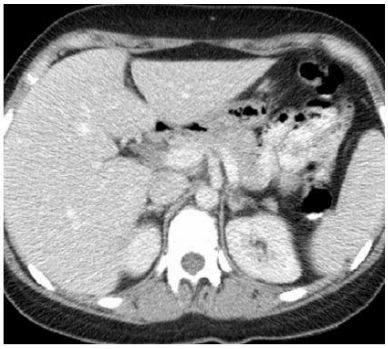


1. Computed Tomography (CT)

1.1 An overview:

A computerized tomography (CT) scan combines a series of X-ray images taken from different angles around the body and uses computer processing to create cross-sectional images (slices) of the bones, blood vessels and soft tissues inside the body. The images produced by this radiological modality provide more-detailed information than plain X-rays do. CT scan can not only diagnose muscles, bone disorders, cancers, and heart diseases, but also can guide procedures such as surgery, biopsy, and radiotherapy. There are some concerns about whether radiation doses in CT scan can cause long-term harm. However, technologists use the lowest dose of radiation possible to obtain the needed medical information. Additionally, newer and faster machines are currently designed to be operated with less radiation than previous CT machines.

CT machine



CT abdomen and pelvis

1.2 The role of radiologic technologists in CT unit:

- They must be able to accurately interpret a physician's scanning instructions.
- They administer contrast materials.
- They prepare and operate the CT scan equipment.
- They position the patient to capture the appropriate images.
- They perform patient transport assist from procedure table to wheelchair while monitoring fall precautions.
- They apply proper safety procedures if needed.

Computed tomography cases				
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	( )	Student independently performs more than 50% of the recorded cases above
	( )	Student independently performs more than 20% of the recorded cases above
	( )	Student independently performs less than 20% of the recorded cases above
Comments or feedback		
Senior technologist' signature		

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Abbreviation and Acronym	Stand for

2. Magnetic resonance imaging (MRI):

2.1 An Overview:

MRI is a type of scan that uses strong magnetic fields and radio waves to produce detailed images of body organs including brain, spinal cord, joints, breasts, heart, blood vessels, and internal organs, such as the liver. It can be used to diagnose conditions, plan treatments and assess how effective previous treatments have been. Human body is made up of water molecules which contain hydrogen and oxygen atoms. At the center of each hydrogen atom is an even smaller particle called a proton that is very sensitive to magnetic fields. When a powerful magnetic field is applied to a specific organ, short bursts of radio waves are sent to that organ knocking out the protons alignment of hydrogen atoms and aligning them at the same direction of the applied magnetic field. When the radio waves turned off, the protons realign. This sends out radio signals, which are picked up by receivers. These signals provide information about the exact location of the protons in the body. They also help to distinguish between the various types of tissue in the body, because the protons in different types of tissue realign at different speeds and produce distinct signals.

2.2 The role of radiologic technologists in MRI unit:

- Explaining the MRI process to patients and ensuring the patients comply with all safety standards.
- Positioning, and possibly sedating, patients to capture clear images of the correct area of the body.
- Removing and then replacing IVs and catheters for the MRI process.
- Maneuvering the MRI equipment and positioning it to capture the correct images.
- Monitoring patients during scanning and maintaining patients' records.
- Monitoring MRI equipment functions.
- Ensuring clear images for Physicians to provide accurate diagnoses.
- Recognizing abnormalities and irregularities in images.

Magnetic resonance imaging cases				
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To be initiated by senior technologist **(please tick one of these options)**			( )	Student independently performs more than 80% of the recorded cases above
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Comments or feedback				
Senior technologist' signature				

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Abbreviation and Acronym	Stand for

3. Nuclear medicine (NM):

3.1 An Overview:

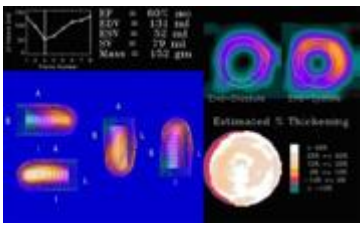
NM technology uses radioactive tracers to visualize organs and tissues. The tracer is usually administered intravenously but may also be administered orally or by aerosol. The radiotracer travels through the area being examined and gives off energy in the form of gamma rays which are detected by a special camera and a computer to create images of the inside of your body. It is distinguished from other modalities in a virtue of characterizing the physiological function of body part rather than anatomy. The most common imaging techniques in nuclear medicine are bone scanning, thyroid scanning and cardiac scanning. The radiopharmaceuticals that are used in scanning are stored and prepared for scanning in a lab called hot lab.

3.2 The role of radiologic technologists in Nuclear Medicine:

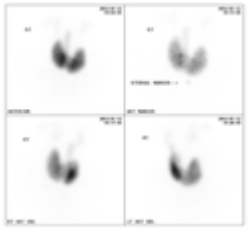
- They operate a gamma camera to produce images for either diagnostic or therapeutic purposes.
- They explain the procedure, position and time for the scan to patients.
- They observe the scanning process and then explain the patient after care.
- They evaluate the quality of produced images.

Gamma Camera

Bone Scanning



Cardiac Scanning



Thyroid Scanning

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Comments or feedback		
Senior technologist' signature		

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Abbreviation and Acronym	Stand for

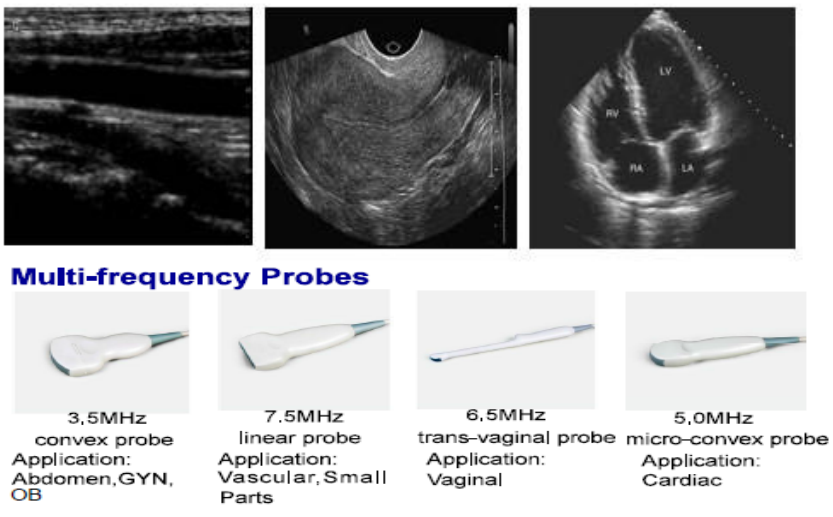
4. Ultrasound

4.1 An overview:

Diagnostic ultrasound is a non-invasive diagnostic technique used to image inside the body. Ultrasound probes (transducers) produce high frequency sound waves, as well as detect the ultrasound echoes reflected back. When these echoes hit the transducer, they generate electrical signals that are sent to the ultrasound scanner. During an ultrasound exam, the technologist will apply a gel to the skin. This keeps air pockets from forming between the transducer and the skin, which can block ultrasound waves from passing into the body. One of the most common uses of ultrasound is during pregnancy, to monitor the growth and development of the fetus, but there are many other uses, including imaging the heart, blood vessels, eyes, thyroid, brain, breast, abdominal organs, skin, and muscles. Ultrasound images are displayed in either 2D, 3D, or 4D (which is 3D in motion).

4.2 The role of radiologic technologists in Ultrasound department:

- Sonographers prepare the ultrasound machine, appropriate probs, and the gel required for scanning.
- Sonographers position the patient properly according to the type of the exam.
- Sonographers clarify the instructions of the scanning to the patients.
- Sonographers follow the radiologist orders to assist with imaging in some cases.
- Sonographers evaluate the quality of the image.



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Abbreviation and Acronym	Stand for

Good Luck