Agenda No. 66.28	Minutes of the Board of Studies Meeting of Dept. of Radiodiagnosis held on 20th & 24th April, 2023

Inter Office : PGI/RAD/1707 /2023.

Colour Coding

Global	GREEN
Regional	BLUE
National	ORANGE
Local (State)	PINK

To : The Dean, SGPGIMS.

From : Dr. Archna Gupta, Prof. & Head, Dept. of Radiodiagnosis, SGPGIMS.

Date : 26th April, 2023.

Sub : Agenda for Academic Board.

Enclosed please find herewith the minutes of Board of Studies meetings held on 20th April, 2023 & 24th April, 2023 of following for Academic Board Meeting which is scheduled to be held on 28th April, 2023:

1. Creation of New Department of Paediatric Cardiac Radiology at upcoming Paediatric Cardiac Centre in the Institute (As per the MOU signed between Govt. of U.P. & Saloni Heart Foundation.
2. Review of M.D. (Radiodiagnosis) Syllabus & Curriculum.
3. Review of PDCC Neuroradiology Syllabus & Curriculum.
4. Review of PDCC Vascular-radiology Syllabus & Curriculum.
5. Review of PDCC Gastroradiology Syllabus & Curriculum.
6. Increase of M.D. (Radiodiagnosis) seats from 6 to 10.
7. Increase of Senior Residents (H.S.)
8. Review of list of experts/Examiner (M.D. & PDCCs)
9. List of experts for selection of faculty.

Archna Gupta
(ARCHNA GUPTA)

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Executive Registrar
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MD RADIODIAGNOSIS – (Curriculum and Syllabus)
GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN RADIODIAGNOSIS

Program outcome

A skilled and competent radiologist capable to conduct and interpret various diagnostic/interventional imaging studies (both conventional and advanced imaging), to organize and conduct research and teaching activities and be well versed with medical ethics and legal aspects of imaging/ intervention.

The **Goal** of this program is to impart training in conventional and modern radiology and imaging techniques so that the post graduate student becomes well versed and competent to practice, teach and conduct research in the discipline of radiology. The student should also acquire basic knowledge in the various sub-specialties of radiology.

1. The trainee shall acquire skills in various aspects of theoretical, clinical and practical realms of Radiology and enable the MD student to offer skill-based diagnostic care of the highest professional standards.
2. The knowledge and attitudes imparted during the program shall enable the MD student to work as an independent clinician, teacher and researcher who is well versed with diagnostic and therapeutic acumen and research methodologies pertaining to Radiology.
3. Such an extensive training shall cater to the health care needs of patients at the **local, regional and national levels and help deliver quality care of international standards to our population.**

Eligibility Requirements
Students who have completed M.B.B.S are eligible for M.D in Radiodiagnosis.

M.D RADIO-DIAGNOSIS- PROGRAM LEARNING OBJECTIVES:

The objective of the program is to train a student to become a skilled and competent radiologist to conduct and interpret various diagnostic/interventional imaging studies (both conventional and advanced imaging), to organize and conduct research and teaching activities and be well versed with medical ethics and legal aspects of imaging/ intervention.

SUBJECT SPECIFIC COMPETENCIES:

A. Cognitive Domain

A post graduate student on completing MD (Radiodiagnosis) should acquire knowledge in the following areas, and be able to:

1. Acquire good basic knowledge in the various sub-specialties of radiology such as chest radiology, neuro-radiology, GI-radiology, uro-radiology, cardio-vascular radiology, musculoskeletal, interventional radiology, emergency radiology, pediatric radiology and women's imaging.
2. Independently conduct and interpret all routine and special radiologic and imaging investigations.
3. Provide radiological services in acute emergency and trauma including its medicolegal aspects.

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4. Elicit indications, diagnostic features and limitation of applications of ultrasonography, CT and MRI and should be able to describe proper cost-effective algorithm of various imaging techniques in a given problem setting.
5. Decide on the various image-guided interventional procedures to be done for diagnosis and therapeutic management.
6. Able to decide on further specialization to be undertaken in any of the branches in Radiodiagnosis such as gastrointestinal radiology, uro-radiology, neuro-radiology, vascular radiology, musculoskeletal radiology, interventional radiology etc.
7. Able to formulate basic research protocols and carry out research in the field of radiology- related clinical problems.
8. Acquire knowledge and teaching capabilities to work as a post graduate student /consultant in Radiodiagnosis and conduct teaching programmes for undergraduates, post graduates as well as paramedical and technical personnel.
9. interact with other specialists and super-specialists so that maximum benefit accrues to the patient.
10. Should be able to organize CME activities in the specialty utilizing modern methods of teaching and evaluation.
11. Acquire knowledge to impart training in both conventional radiology and modern imaging techniques so that the post graduate student is fully competent to practice, teach and do research in the broad discipline of radiology including ultrasound, Computed Tomography and Magnetic Resonance Imaging.
12. Acquire knowledge of interventional radiology.

B. Affective Domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

Practical Training will include two major aspects:

A) Interpretation of images, and
B) Skill in performing a procedure.

A) Interpretation of images:

The student should be able to interpret images on all imaging modalities of diseases of following organs :

1. Musculo-skeletal System - Interpretation of diseases of muscles, soft tissue, bones and joints including congenital, inflammatory, traumatic, endocrine and metabolic, neoplastic and miscellaneous conditions.
2. Respiratory System - Interpretation of diseases of the chest wall, diaphragm, pleura and airway; pulmonary infections, pulmonary vasculature; pulmonary neoplasm; diffuse lung disease; mediastinal disease, chest trauma; post-operative lung and X-ray in intensive care.
3. Cardiovascular System - Interpretation of diseases and disorders of cardiovascular system (congenital and acquired conditions) and the role of imaging by conventional radiology, ultrasound, colour Doppler, CT, MRI, Angiography and Isotopes Studies.
4. Gastro-intestinal tract and hepato-biliary pancreatic system - Interpretation of diseases and disorders of mouth, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, diseases of omentum, peritoneum and mesentery: acute abdomen, abdominal trauma. Diseases and disorders of liver, biliary system and pancreas.

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5. Urogenital System - Interpretation of various diseases and disorders of genitourinary system. These include: congenital, inflammatory, traumatic, neoplastic, calculus disease and miscellaneous conditions.
6. Central Nervous System (C.N.S.) - Interpretation of diseases and disorders of the head, neck and spine covering, congenital, infective, vascular, traumatic neoplastic degeneration metabolic and miscellaneous condition.
7. Imaging in Emergency Medicine.
8. Imaging in Obstetrics and Gynecology.
9. Imaging of Breast and interventional procedures.
11. ENT, EYE and Dental Imaging.
11. Imaging of endocrine glands and those involved with metabolic diseases.
12. Clinical applied radionuclide imaging.
13. Interventional Radiology.

B) Skills in performing a procedure

The student should be able to perform the following procedures:
1) GIT contrast studies: Barium studies (swallow, upper GI, Follow through, enema); fistulogram; sialogram; cologram/ileostogram
2) GU: Excretory urography, MCU, RGU, nephrostogram, genitogram,
3) Ultrasound: Studies of whole body including neonatal transfontanelle studies, Doppler studies.
4) CT scan: should be able to position a patient, plan study as per the clinical indication, do reconstruction of images, perform triple phase study, perform & interpret advanced applications like CT enterography, CT angiography etc.
5) MRI: plan and perform MRI studies of whole body
6) DSA: should be able to describe the techniques, do (if available to student) transfemoral puncture and insert catheter, help in angiographic procedures both diagnostic and interventional.
7) Radiography: should be able to independently do radiography of common and some important uncommon views of different body parts. This includes positioning, centering of X ray beam, setting of exposure parameters, exposing and developing the films. The student should be familiar with not only conventional radiography but with CR and DR systems.
8) Interventional radiology: The student should be able to perform simple, common non-vascular procedures under ultrasound and fluoroscopy guidance e.g. abscess drainage, drainage catheter placement, nephrostomy, biliary drainage etc. The student should have knowledge of common vascular interventions e.g stricture dilatation using balloon catheters, embolization with gel foam and other agents, names ofcommon catheters, handling of intravenous contrast reactions; techniques, indications
and contraindications for various procedures

Syllabus: M.D Radio-diagnosis

The detailed MD curriculum and syllabus approved in the prior board of studies (dated May 3 2010, June 20, 2010 is attached as annexure 3& 4), and shall be continued. The format of the syllabus, course content and curriculum is re-arranged as per the recent NMC guidelines.

Course contents:

- **Anatomy:** Gross and cross sectional anatomy of all the body systems.
- **Pathology:** Gross morphology of pathological conditions of systemic diseases affecting all organ systems.
- **Radiology Course:** This would cover imaging and interventions of diseases affecting all the body systems:
  A. Chest

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B. Cardiovascular system
C. Musculoskeletal including soft tissue
D. Gastrointestinal system
E. Hepato-biliary-pancreatic system
F. Urogenital (genito-urinary) system
G. CNS including head and neck
H. Obstetrics and gynaecology
I. ENT, eye, dental, breast
J. Endocrine and metabolic system
K. Clinically applied radionuclide imaging

Radiological Physics

1. Introduction of general properties of radiation and matter: Fundamentals of nuclear physics and radioactivity.
2. Interaction of x-rays and gamma rays with matter and their effects on irradiated materials
3. X-ray Generating Apparatus
4. Screen-film radiography
5. Film processing: Dark room, dry processing, laser /dry chemistry cameras, artifacts.
6. Fluoroscopy: Digital including flat panel units, fluoroscopy cum radiography units
7. Digital radiography: Computed Radiography, Flat panel radiography
8. Other equipments: Ultrasound including Doppler, CT, MRI and DSA
9. Contrast Media (Iodinated, MR & Ultrasound) - types, chemical composition, mechanism of action, dose schedule, route of administration, adverse reaction and their management.
10. Nuclear Medicine: Equipments, isotopes in various organ systems and recent advances.
11. Picture Archiving and Communication System (PACS) and Radiology Information System (RIS) to make a film-less department and for Teleradiology
12. Radiation protection, dosimetry and radiation biology.
13. Image quality and Quality Assurance (QA)
14. Recent advances in radiology and imaging

The student should have knowledge of the following physics experiments:

- Check accuracy of kVp and timer of an X ray unit
- Check accuracy of congruence of optical radiation field
- Check perpendicularity of x ray beam
- Determine focal spot size
- Check linearity of timer of x ray unit
- Check linearity of mA
- Verification of inverse square law for radiation
- Check film screen contact
- Check film screen resolution
- Determine total filtration of an x ray unit
- Processor quality assurance test
- Radiological protection survey of an x ray unit
- Check compatibility of safe light- we may delete this
- Check performance of view box, Effect of kVp on x ray output

Radiography and processing techniques:

1. Processing techniques: includes dark room and dry processing.
2. Radiography of the musculo-skeletal system including extremities.

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3. Radiography of the chest, spine, abdomen and pelvic girdle.
4. Radiography of the skull, orbit, sinuses.
5. Contrast techniques and interpretation of GI tract, hepato-biliary tract, pancreas etc.
6. Contrast techniques and interpretation of the Central Nervous system.
7. Contrast techniques and interpretation of the cardiovascular system including chest.
8. Contrast techniques & interpretation of genito-urinary system including Obstetrics & Gynaecology.
9. Paediatric radiology including MCU, genitogram, bone age.
10. Dental, portable and emergency (casualty) radiography.

TEACHING AND LEARNING METHODS

Teaching Methodology

The post graduate student shall be given the responsibility of interpreting and performing investigations in a gradual and phased manner under supervision, after the student demonstrates skill and efficiency at each step.Teaching sessions shall be an overall judicious amalgamation of case presentations, journal clubs, seminars, group discussions, focused brief topic presentations as allotted from time to time, case-based learning, integrated and interdepartmental meetings including any other collaborative activity with allied departments, as deemed necessary.

Suggested modalities of teaching-learning methods are summarized below but shall not be limited to these. The frequency of the mentioned teaching and learning methods may vary based on perceived requirements, candidates' competencies, work load and overall working schedule. Self-directed motivational learning forms a key part of the training which shall be integrated into day to day learning.

Formal teaching sessions

These include regular reporting sessions, case presentations and demonstrations, didactic lectures, journal clubs, seminars, discussions related to non-invasive and invasive investigations, case-based learning, interdepartmental meetings and collaborative meetings with allied departments.

The training is spread over 3 years and includes following components:

1. Physics related to imaging
2. Rotational posting in various sub-specialties.
3. Seminars, case discussion, journal club.
4. Research methodology and statistics.
5. A log book should be maintained by the student and will be checked and signed regularly by the faculty-in-charge during the training program.
6. The postgraduate students shall be required to participate in the teaching and training program of undergraduate students and interns.
7. The postgraduate student would be required to present one poster presentation, to read one paper at a national/state conference and to submit one research paper which should be published or accepted for publication or sent for publication to a peer reviewed journal, during the period of his/her postgraduate studies so as to make him/her eligible to appear at the postgraduate degree examination.
8. Department will encourage e-learning activities. Guest lectures by invited faculty will also be arranged periodically to enhance the scope of learning- by exposure to a larger variety of cases and images.

During the 3 years following components will be included:

a) In-service training of residents.

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b) Seminars/Case discussion/Group Discussion/Journal Club
c) Research methodology and thesis
d) Assessment

a) In-service training of the residents:

- The residents shall be posted in various radiography rooms where they will be given practical training on machines and techniques. During their posting in plain radiography the resident will be exposed to plain x-rays radiography / processing & reporting, initially under supervision and later on independently.
- The resident will do all the investigations in uroradiology and gastro radiology initially under supervision of senior resident/ faculty and later on independently and shall report all these studies independently to be checked by senior residents / faculty in-charge before dispatch to the respective departments.
- For rest of the imaging modalities like USG, CT, MRI, Angiography and Interventional radiology, resident will work under supervision of senior resident and faculty in-charge and will report all the cases with senior resident and faculty. Apart from routine postings these residents will be put on emergency duties on rotation bases. They will perform/ assist senior residents/ faculty in emergency radiological procedures.

b) Seminars/Journal Club/Case discussions:
The seminar/case discussions are done by junior residents with the help of Senior Residents/Consultants on pre-selected topics through-out three years:

Seminars	Once in a week
Case discussion	Once in a week
Case of the day	Daily for one hour
Journal Club	Twice a month
Gastro-radiology	Once in a week
Neuro-radiology	Once in a week
Uro/Nephro-radiology	Twice a month
Endo-radiology	Twice a month
Immuno-radiology	Once a month
Clinical grand round	Once in a week
Morbidity/Mortality clinic	Once in a month

The residents will be able to achieve practical knowledge in the field during discussion on the various films in these sessions.

c) Research methodology and Thesis:

- 01 / 02 Courses (As per Institute criteria)
- Thesis -As per criteria laid down by the institute.Thesis should be submitted 6 months before the final examination.

Suggested Reading: Books (latest edition)

1. Grainger & Allison's Text book of Diganostic Radiology (Churchill Livingstone)
2. Textbook of Gastrontestinal Radiology- Gore and Levine (Saunders)
3. MRI of Brain and Spine - Scott Atlas (LWW)
4. Diagnosis of Diseases of the Chest -Fraser
5. Diagnostic Imaging Series: (Amirsys, Elsevier)

Abdominal Imaging, Orthopedics, Head and Neck, Neuroradiology, Pediatric

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Radiology Chest, Obstetrics, Breast
6. MRI in Orthopedics and Sport Injuries - Stoller
7. Skeletal Radiology - Greenspan
8. Abdominal-Pelvic MRI - Semelka (IWW)
9. Caffey's Pediatric Radiology
10. CTI and MRI of the whole body- John R. Haaga
11. Text Book of Radiology and imaging - Davod sulton
12. Diagnostic ultrasound - Carol C. Rumack
13. AIIMS-MAMC-PGI's Comprehensive Textbook of Diagnostic Radiology, Volume 1, 2, 3

E learning resources

1. www.RSNA.org
2. www.RCR.AC.UK
3. www.sor.org

Resources available in SGPGI

4. Clinical Key which gives access to various Radiology journals https://www.clinicalkey.com
5. BMJ
6. Uptodate
7. Ermed.in

SGPGI Library SGPGI (record of books and journals till 2020) may be seen on following ip address : 172.25.0.53. Radiology books 803,, 31 foreign journals and 1 Indian journal.

ASSESSMENT

FORMATIVE ASSESSMENT, during the training program. Formative assessment will be continual and will assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment will be done every 6 months, cover all domains of learning and used to provide feedback to improve learning; it will also cover professionalism and communication skills. The Internal Assessment will be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training will be based on:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self-directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure-I).

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000. Postgraduate Examination.

Examiners: Two Internal and Two External Examiners (as per existing pattern in the Institute)

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The Post Graduate Examination was conducted in three parts.

1. Thesis:

- Every post graduate student shall carry out work on an assigned research project
- under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis (Dissertation). Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.
- Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory Examination

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D. shall be held at the end of 3rd academic year. An academic term shall mean six month's training period. There shall be four theory papers:

Paper I: Basic sciences related to Radiology (consists of Anatomy, Pathology, Basic and Radiation Physics, Imaging Techniques, and Film processing).

Paper II: Chest, CVS, CNS including Head & Neck, Eye, ENT, Musculo-skeletal, pediatric radiology and Breast (including Mammography).

Paper III: Abdominal Imaging including GI, GU, Hepatobiliary, endocrine and metabolic, Obstetrics and Gynaecology and Interventional radiology

Paper IV: Recent advances, nuclear medicine; Radiology related to clinical specialties

All papers would consist of short answer questions (minimum 10) covering all aspects of the course.

3. Practical/clinical and oral Examination (will include cases, spots, ultrasound procedure, physics, implements etc)

Practical Examination will have:

1. 3-4 Cases
2. Film Quiz (50 – 60 Spots)
3. To perform Ultrasound on a patient

Oral/Viva voce will include:

- Radiation Physics and quality assurance
- Implements, Catheters and contrast
- Cassettes, films, dark room, equipment
- Radiographic techniques, Radiological procedures,
- Gross pathology

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Annexure- 1

Postgraduate Students Appraisal Form(to be filled by faculty)

Name of the Department/Unit :
Name of the PG Student :
Period of Training : From..... To.....

Sr No	Particulars	Not Satisfactory (1,2,3)	Satisfactory 4 5 6	More Than Satisfactory 7 8 9	Remarks
1	Journal based / recent advances learning				
2	Patient based or Skill based learning				
3	Self directed learning and teaching				
4	Departmental and interdepartmental learning activity				
5	External and Outreach Activities CMEs				
6	Thesis / Research work				
7	Log Book Maintenance				

Publications Yes/ No Remarks*_____ *REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

Signature of assessee Signature of consultant Signature of HOD

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Annexure 2

SELF ASSESSMENT SHEETS (End of each posting)

Sheets to be pasted in the log books for record and a copy to be submitted

Posting Area	
Posting Number	**First**
Date (Period)	

By the end of this posting I can perform the following-

Task	**Confidently**	**Need support**	**Cannot perform**
History taking; communication skills			
Patient preparation			
Equipment handling			
Checking Quality			
Patient positioning			
Planning Protocols			
Performing scan/ procedures			
Image interpretation			
Reporting			

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Changes in the MD curriculum and syllabus

The detailed MD syllabus approved in the prior board of studies (dated May 3 2010, June 20, 2010) shall be continued. The format of the syllabus, course content and curriculum is re-arranged as per the recent NMC guidelines. The changes are as follows:

Additions (value addition at S.G.P.G.I) approved in syllabus of the MD Radio-diagnosis program :

1. The students trained at SGPGI would have gained knowledge in the advanced imaging modalities which include:

- Advanced MRI applications, including functional imaging, BOLD imaging, Diffusion and perfusion imaging, Stroke protocols, 3D sequences, Radio-therapy and Neuro-navigation protocols, Cardiac MRI, Breast MRI, MR Enterography, MRI defaeco-graphy
- Coronary and non-coronary CT scans.
- Digital Breast Tomosynthesis.
- Ultrasound based micro-vascular imaging and Elastography techniques.
- Advanced hepato-biliary interventions, vascular interventions, neuro-interventions and genito-urinary intervention techniques as well as biopsy techniques including
- USG and CT guided biopsies and drainage, percutaneous nephrostomies, PTBD, biliary stenting, RFA, microwave ablation, diagnostic vascular angiography and basic embolization for tumors (HCC), renal and GI bleeds, 6 vessel cranial DSA.

2. ***The prior MD syllabus included***
   - Experience in echocardiography
   - Observing coronary angiography and other cardiac angiographic procedures.

The Board recommended removing this from the syllabus.

3. The PG student would be required to present **one poster presentation**, to read one paper at a national/state conference and to **submit one research paper** which should be published or accepted for publication or sent for publication to a peer reviewed journal, during the period of his/her postgraduate studies so as to make him/her eligible to appear at the postgraduate degree examination.
4. **Guest lectures** by invited faculty will also be arranged periodically to enhance the scope of learning- by exposure to a larger variety of cases and images.
5. **Changes in assessment methods**- to conform to NMC guidelines, appraisal and self-assessment forms added, and order of topics in theory papers changed as per NMC format.
6. JR rotation postings remained almost same as followed earlier, however, nomenclature modified as per NMC specifications. Also the Board suggested that the Department maintain flexibility in rotations, and post the residents as per department needs when required.
7. Till 2018- MD students were posted for two months in KGMU- 1 month each for Trauma and Obs/ gynaecology. In the board of studies conducted on 3-8-2018, it was decided that since ATC has opened in SGPGI- the students will be posted in ATC SGPGI for one month (instead of KGMU).
8. In the board of studies conducted on 20-4-2023, it was decided that since SGPGI MRH department has enough Obs/ Gynaecology workload, JRs may be posted in MRH Dept of SGPGI, instead of being posted in KGMC.
9. Standard operating procedure of Radio-diagnosis department related to residents' duties and responsibilities made- unanimously agreed by the Board members.

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JUNIOR RESIDENCY POSTINGS (36 months)

POSTINGS at SGPGI Radiology dept	**Duration (mths)**	**Total**
Conventional chest, abdomen, musculoskeletal including skull, spine, PNS	3+0+1	4
Breast imaging (mammography, DBT, USG, guided procedures)	1+1+0	2
Contrast study- GIT & fluoroscopic guided procedures	2+1+0	3
Contrast study- G.U & fluoroscopic guided procedures	2+0+0	2
Intervention	0+1+1	2
DSA	0+1+1	2
USG, Doppler (including obs/gynaec) and US guided interventions	2+3+3	8
CT and CT guided interventions	1+2+2	5
Emergency radiology/ Trauma	0+1+1	2
MRI	1+2+1	4
Interdepartmental (elective posting)	0+0+2	2
TOTAL	**36**	**36**

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Standard operating Procedure: Department of Radio-diagnosis

MD students:

Within the first 15 days of joining the programme, the students will be oriented about the Department: equipment, facilities, work ethics and protocols as well as their duties and responsibilities. They should go through the NMC guidelines regarding competency based PG programme (https://www.nmc.org/information-desk/for-colleges/pg-curricula-2/).

JRs, SRs- PDCC as well as hospital services :

Department provides round-the-clock services. Morning teaching sessions/ inter-departmental meetings are held on all working days from 8:00 -9:00 a.m. Routine department timings are from 9:00 am to 5:00 pm from Mondays to Fridays; 9:00 am to 1:00 pm on Saturday (after which emergency duties are rotated as per duty rosters). Academic rosters are available in the Radiology office.

Duties and Responsibilities:

- Attendance in all teaching programmes including morning classes and interdepartmental meetings is compulsory for all residents.
- Residents should report to designated posting by 9:30 am on all working days.
- Clinical postings and emergency duties are by rotation and the residents may not leave the place of posting without due permission. Attendance shall be marked absent in case residents are not physically present in the designated areas during working hours.
- Mutual exchange of posting and emergency duties are not allowed. Permission from faculty-on-call/ HOD should sought in case there is some urgent need for duty-exchange.
- Residents should discuss with the concerned faculty, in advance, for the preparation of seminars/ journal clubs and case discussions. **Skipping sessions is not permissible (except in emergency situations) and should be duly informed. Presentations missed without prior information will be marked zero in the marksheet.**
- Senior residents should help in conceptualizing and preparation of academic activities. Inputs from the deputed SRs also need to be incorporated in the presentations to ensure fruitful discussions.
- Professionalism, good communication skills, work ethics and co-ordinated team-work are a part of the teaching-training program and will be assessed continuously (as per the NMC guidelines). Residents are expected to maintain the same at all times. This includes communication with patients/ relatives/ peers and staff.
- Practical training involves the use of High-end, state-of-the-art equipment- this privilege needs to be responsibly utilized. Residents to take care that equipment is not mis-handled.

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Delicate items such as ultrasound probes, MRI coils have to be carefully handled and safely stored to prevent damage. Subordinate staff is there to assist you.

- The residents should familiarize themselves about equipment handling, cleaning norms, antiseptic precautions and safety guidelines within 15 days of joining the PG course- appropriate disciplinary action will be taken in case of negligence.
- It is the responsibility of the residents to ensure that all reports are legibly written (typed whenever possible), name & designation of resident with time and date of report should be clearly visible in the document.
- It will be the responsibility of the on-call resident to ensure that all emergency scans/ procedures are properly documented, accepted in HIS, immediately reported and results entered in the appropriate Departmental registers also. Name & designation of resident with time and date of report should be clearly visible in the document.

FIRST YEAR PG- duties and responsibilities

1st year	Duties and responsibilities (mainly learn how)
Conventional, contrast studies, mammography, Ultrasound, Doppler, US guided interventions; CT , CT guided interventions; Emergency radiology & trauma	• **Learning about proper equipment handling, cleaning norms, antiseptic precautions and safety guidelines.** • Patient preparation: Checking for clinical details; prior reports; indications/ contra-indications for radiation/MRI and contrast. • **Learning how** investigations (Xray/contrast studies/ USG/mammography/ CT/MRI etc) are done. • Adminstration of I.V contrast. • Observing patients for any complications and co-ordinating management. • Co-ordinating with seniors for planning protocols and performance of studies. • Learning how post-processing & documentation (MPR/ 3D recons/ volumetry, filming, preparation of reports etc) is done. • Ensuring that filming is done timely and appropriately; • Ensuring that reports are prepared/ communicated timely. • Compilation of patient data, maintenance of record of the investigations and reporting done in the emergency registers as per Department and Institute protocols.

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SECOND YEAR PG- duties and responsibilities

2nd year	Duties and responsibilities (start performing)
Conventional, contrast studies, mammography, Ultrasound, Doppler, US guided interventions; CT , CT guided interventions; MRI, Emergency radiology & trauma	• Patient preparation: Checking for clinical details; prior reports; indications/ contra-indications for radiation/MRI and contrast. • **Planning and performing** investigations/ procedures under supervision. • Adminstration of I.V contrast. • Observing patients for any complications and co-ordinating management. • Co-ordinating with seniors for planning protocols and performance of studies. • Learning how post-processing & documentation (MPR/ 3D recons/ volumetry, filming, preparation of reports etc) is done. • Ensuring that filming is done timely and appropriately; • **Start interpreting and preparing reports and get cross-checked by seniors at place of posting.** • Compilation of patient data, maintenance of record of the investigations and reporting done in the emergency registers as per Department and Institute protocols.
DSA and interventions	• Patient preparation, checking for clinical details/ taking relevant history, checking prior reports/ checking for indications and contra-indications. • Prepare list of consumables and counsel patients/ relatives. • Assist procedures, perform basic procedures under supervision. • Administer I.V contrast. • Observing patients for any complications and co-ordinating management. • Co-ordinating with seniors for planning and performance of procedures. • Learning how post-processing & documentation is done. • Compilation of patient data for Departmental research.

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THIRD YEAR PG- duties and responsibilities

3rd year	Duties and responsibilities (performing and interpreting studies)
Conventional, contrast studies, mammography, Ultrasound, Doppler, US guided interventions; CT , CT guided interventions; MRI, Emergency radiology & trauma	• Patient preparation: Checking for clinical details; prior reports; indications/ contra-indications for radiation/MRI and contrast. • **Planning and performing** investigations/ procedures. • Administration of I.V contrast. • Observing patients for any complications and co-ordinating management. • Post-processing & documentation (MPR/ 3D recons/ volumetry, filming, preparation of reports etc) • Ensuring that filming is done timely and appropriately. • **Interpret and prepare reports independently and get cross-checked by faculty.** • Compilation of patient data, maintenance of record of the investigations and reporting done in the emergency registers as per Department and Institute protocols.
DSA and interventions	• Patient preparation, checking for clinical details/ taking relevant history, checking prior reports/ checking for indications and contra-indications. • Prepare list of consumables and counsel patients/ relatives. • Assist procedures, perform basic procedures under supervision. • Administer I.V contrast. • Observe patients for any complications and co-ordinate management. • Co-ordinating with seniors for planning and performance of procedures. • Post-processing & documentation. • Compilation of patient data for Departmental research

INTERNAL ASSESSMENTS : M.D RADIO-DIAGNOSIS, S.G.P.G.I

The Head of Department will nominate two faculties every 6 months to monitor the teaching-training program for that duration. This will include formative assessments, filling of student appraisal forms, collecting the self-assessment forms & conducting internal assessments at the end of every 6 months. The faculty-in-charges will be rotated every 6 months. Formative assessment: Patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system will be assessed. Log book will be marked at end of each posting.

Students will be responsible for submitting their self-assessment forms & getting their log books signed. The moderating faculties of the individual academic sessions will evaluate the presentations on the same day and marks obtained will be added to the 6-monthly internal assessment (the student will be responsible for a submitting the marksheets at the time of exam)

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The 6-monthly schedule is outlined below:

Exams	Theory Systems including anatomy & pediatric	Modalities	Radiation & radiography	Practical / Procedures Skills in performing scans/ procedures	Log book
6 month	Chest, Genito-urinary system	X-ray and mammography	Radiation physics	X-ray and mammography	
12 months	Gastro-intestinal & hepatobiliary system	conventional procedures & USG	Image processing	contrast studies (including GI &GU procedures), USG,	
18 months	CVS, Endocrine (including breast), MSK	CT	Radiation protection	CT and related procedures	
24 months	CNS, head & neck	MRI	Rad_positioning - other	MRI and IR	
30 months	Emergency, trauma, Obs & Gyane and recent advances	DSA, IR& nuclear medicine	Rad_positioning - skull_spine	DSA and special procedures	

Marks obtained from : Log book assessment (checked & marked in each posting).**Thesis presentation**; marks obtained in Seminars / journal clubs/ interdepartmental meetings.
PG student appraisal forms (annexure 1 of NMC guidelines) will be filled by the assessing faculty every 6 months.

Practical assessment will include :

Mths	Cognitive & psychomotor	Interpretation of images	Skills	Affective:
6	Elicit relevant clinical details, monitor sick patients	Long/ short cases/ spotters; Table viva	Basics of Radiation safety, how to handle equipment. Basics of contrast media - dose/ contra-indications/ manage contrast reactions. Position, filming x-rays, mammography, and use PACS	To function as part of team, ethics, communication skills
12	Elicit clinical details, observe/ monitor sick patients; conduct/ plan studies/ decide approach; provide services in acute settings; problem-solving abilities; formulate research protocols; impart teaching-training; organizational abilities (in CMEs)	Long/ short cases/ spotters; Table viva	Plan & perform contrast studies & manage contrast reactions Plan/perform USG, Color doppler, guided FNAC-biopsies, related procedures Plan & perform Contrast studies (GI, GU, miscellaneous)	Same as above
18	Same as above	Same as above	Position, plan, perform, post-process CT (decide, customize protocols) CT- related procedures. Basics of MRI safety, how to handle coils, scanner, MR anatomy. How to plan and perform MRI USG/ elasto/ color doppler, guided procedures (interventions/ DSA/ biopsies)	Same as above
24	Same as above	Same as above	Basics of MRI safety, how to handle coils, scanner, MR anatomy. How to plan and perform MRI(customize protocols, new technques, functional etc). IR related procedures.	Same as above
30	Same as above	Same as above	CT, MRI, USG, guided procedures (interventions/ DSA/ biopsies); recent advances	Same as above

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Annexure 1

Postgraduate Students Appraisal Form(to be filled by faculty)

Name of the Department/Unit :

Name of the PG Student :

Period of Training : From..... To.....

Sr No	Particulars	Not Satisfactory (1,2,3)	Satisfactory 4 5 6	More Than Satisfactory 7 8 9	Remarks
1	Journal based / recent advances learning				
2	Patient based or Skill based learning				
3	Self directed learning and teaching				
4	Departmental and interdepartmental learning activity				
5	External and Outreach Activities CMEs				
6	Thesis / Research work				
7	Log Book Maintenance				

Publications Yes/ No Remarks*_____ *REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

Signature of assessee Signature of consultant Signature of HOD

Annexure 2

SELF ASSESSMENT SHEETS (End of each posting)

Sheets to be pasted in the log books for record and a copy to be submitted

Posting Area	
Posting Number	**First**
Date (Period)	

By the end of this posting I can perform the following-

Task	**Confidently**	**Need support**	**Cannot perform**
History taking; communication skills			
Patient preparation			
Equipment handling			
Checking Quality			
Patient positioning			
Planning Protocols			
Performing scan/ procedures			
Image interpretation			
Reporting			

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ANNEXURE 3 & 4.
3-5-2010
20-6-2010.

CURRICULUM FOR M.D. (RADIODIAGNOSIS)

The training is spread over 3 years and includes following components:

a) In-service training of residents.
b) Seminars/Case discussion/Group Discussion/Journal Club
c) Research methodology and thesis
d) Assessment

a) In-service training of the residents:

The residents shall be posted in various radiography rooms where they will be given practical training on machines and techniques. During their posting in plain radiography the resident will be exposed to plain x-rays radiography / processing & reporting, initially under supervision and later on independently. The resident will do all the investigations in uroradiology and gastro radiology initially under supervision of senior resident/ faculty and later on independently and shall report all these studies independently to be checked by senior residents / faculty in-charge before dispatch to the respective departments. For rest of the imaging modalities like Ultrasound, Computed tomography, MRI, Angiography and Interventional radiology, resident will work under supervision of senior resident and faculty in-charge and will report all the cases with senior resident and faculty

- Basic Radiology - 6 months
- Urogenital Radiology - 3 months
- Gastro radiology - 3 months
- Ultrasound - 3 months
- CT - 3 months
- MRI - 3 months
- Angiography - 3 months
- Interventional-radiology - 3 months
- Interdepartmental Posting
  - Nuclear Medicine - 4 weeks.
  - Cardiology - 2 weeks
  - Pathology - 2 weeks

- Exposure to conventional radiology like Osteology/Trauma will be given to any other MCI recognized Radiodiagnosis department for 1 month.

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- Remaining 6 months – The training can be repeated in a specific modality as per discussion with the faculty of the department depending on the assessment of the student.

- Apart from routine postings these residents will be put on emergency duties on rotation bases. They will perform/ assist senior residents/ faculty in emergency radiological procedures.

b) Seminars/Journal Club/Case discussions:

The seminar/case discussion are done by junior residents with the help of Senior Residents/Consultants on pre-selected topics through out three years:

Seminars	-	Once in a week
Case discussion	-	Once in a week
Case of the day	-	Daily for one hour
Journal Club	-	Twice a month
Gastro-radiology	-	Once in a week
Neuro-radiology	-	Once in a week
Uro/Nephro-radiology	-	Twice a month
Endo-radiology	-	Twice a month
Immuno-radiology	-	Once a month
Clinical grand round	-	Once in a week
Morbidity/Mortality clinic	-	Once in a month

The residents will be able to achieve practical knowledge in the field during discussion on the various films in these sessions.

c) Research methodology and Thesis:

- 01 / 02 Courses (As per Institute criteria)
- Thesis -As per criteria laid down by the institute
  Thesis should be submitted 6 months before the final examination

d) Assessment:

The faculty members of the department quarterly record the student's performance where he has worked. The internal assessment of the student will include his professional assessment; behavior towards his colleagues and patients, organization capabilities, approach towards teaching and research, number of papers read in conferences and published work.

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The examinations/Final examination will be as per SGPGIMS guidelines, which is decided by the Academic Board of the Institute.

Final M.D. Examination:

These are conducted as per the pattern in the Institute on following lines,

Examiners: Two Internal and Two External Examiners

Examination System:

Theory Papers: There are 4 theory papers entitled:

Paper – I	Basic Sciences related to Radiology - Anatomy, Embryology Physiology, Basic and Radiation Physics, Radiological equipments, Radiographic Technique, Dark Room Processing,
Paper – II	Central Nervous system including orbits, Ear, Nose, Throat including neck, Cardiovascular system, Respiratory system
Paper – III	Gastrointestinal system, Genitourinary system including Obstetrics / Gynecology, Musculoskeletal system including Osteology, Breast, Soft tissues
Paper – IV	Recent Advances in Radio-diagnosis and Imaging Modalities

Practical: This will consist of the following components

a) Long Cases
b) Short Cases
c) Spot Diagnosis
d) Radiation Physics and Techniques
e) Viva-voice

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ANNEXURE – 4

SYLLABUS FOR THREE YEAR M.D. (RADIODIAGNOSIS)

MD COURSE CONTENT

A) Basic Physics:
(Equipments, Radiography & Radiation Protection)

Transformer
- Principle and type of transformer
- Functions

Rectification
- Half ware, full wave and 3 phase rectification
- Solid state rectifiers
- Principles

X-Ray tubes
- Principle behind the x-ray production
- Stationary and rotating anode, principle constructions

Tube rating
- Modernization of x-ray tube
- Tube faults

Basic x-ray circuit
- Auto transformer
- K.V. Control and timers

- Generators
- Mobile portable units
- Structure of x-ray film and characteristic curve
- Formation of latent image and its chemical development processing cycle, constitution of developing chemicals
- Constituents of fixing chemicals
- Manual and automatic processing devices
- Intensifying screens
- Quality Assurance in radiography
- Film faults
- Control of scattered radiation
- Grid characteristics
- Types of grids
- Cones and collimators
- Fluoroscopy and image intensifiers
- Computed Radiography
- Digital Radiography
- Dry Cameras and digital image processing
- Computerized Axial Tomography
- Ultrasonography
- Magnetic Resonance Imaging
- Digital subtraction angiography

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- Principles of Electromagnetic radiation and interaction of radiation with matter
- Photoelectric and Compton effects
- Radiation protection
- Personal monitoring
- Permissible dose
- ICRP recommendations and protection
- Radioisotopes
- PACS and RIS and Teleradiology.

B) Chest:

- Knowledge of respiratory anatomy and clinical practice relevant to clinical radiology.
- Knowledge of the manifestations of thoracic disease as demonstrated by conventional radiography and CT.
- Knowledge of the application, risks and contraindications of the technique of image-guided biopsy of chest lesions
- Reporting of plain radiographs performed to show chest disease
- Supervising and reporting computed tomography of the chest, including high-resolution examinations
- Drainage of pleural space collections under image guidance.
- Observation of image-guided biopsies of lesions within the thorax
- Familiarity with the applications of the following techniques:
    - Magnetic Resonance Imaging.
    - Angiography

Course content:

- Normal anatomy & Physiology of the Chest/ respiratory system
- Methods of Examination, Principles, Technique & Application
- Diseases of lung parenchyma/ tumors and congenital diseases
- Pulmonary collagen disease
- Mediastinum: anatomy and diseases
- Pleura
- Pulmonary Infections
- Disease of the airways – Collapse and consolidation/ emphysema/bronchitis
- Diffuse Lung disease
- Chest trauma
- Post-op chest
- Irradiated chest
- Pediatric chest

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C) Cardiac:

- Knowledge of cardiac anatomy, and clinical practice relevant to clinical radiology.
- Knowledge of the manifestations of cardiac disease demonstrated by conventional radiography
- Reporting plain radiographs performed to show cardiac disease.
- Supervising and reporting, computed tomography and/or magnetic resonance imaging performed to show cardiac disease
- Experience in echocardiography
- Observing coronary angiography and other cardiac angiographic procedures.

Course content:

- Pericardium
  - Anatomy
  - Normal appearance in Imaging modalities
  - Diseases: approach, appearance and differential diagnosis

- Pulmonary Circulation
  - Anatomy & Physiology
  - Approach
  - Appearance in congenital & acquired disease
  - Pulmonary Embolization: Pathophysiology, approach & appearance

- Heart disease:

  -Vascular heart disease: Approach, appearance & differential diagnosis
  - Ischaemic heart disease: Approach & appearance
  - Cardiomyopathies: Approach & appearance
  - Congenital heart disease: Anatomy / Embryology of physiology, classification, approach and appearance

- Arteriograpyh, Venography, lymphatics
  Technique & appearance

- Interventional procedure;
  - Embolization
  - Dilatation & Stenting
  - Recanalization
  - Stent graft

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D) Breast/ Mammography

- Knowledge of breast pathology and clinical practice relevant to clinical radiology.
- Understanding of the radiographic techniques employed in diagnostic mammography.
- Understanding of the principles of current practice in imaging and breast cancer screening.
- Awareness of the proper application of other imaging techniques to this specialty (e.g. Ultrasound, Magnetic Resonance Imaging and Radionuclide Radiology)
- Mammographic reporting of common breast disease
- Participating in mammographic reporting sessions (screening and symptomatic)
- Observation of breast biopsy and localization

E) Gastrointestinal (including liver, pancreas and spleen):

- Knowledge of gastrointestinal anatomy and clinical practice relevant to clinical radiology.
- Knowledge of the radiological manifestations of disease within the abdomen on conventional radiography, contrast studies (including ERCP), ultrasound, CT MRI, radionuclide investigations and angiography
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.
- Reporting plain radiographs performed to show gastrointestinal disease
- Performing and reporting the following contrast examinations:
    - Swallow and meal examination
    - Small bowel studies
    - Enema examinations

- Performing and reporting transabdominal ultrasound of the gastrointestinal system and abdominal viscera
- Supervising and reporting Computed Tomography and Magnetic Resonance Imaging of the abdomen
- Performing:
    - Ultrasound-guided biopsy and drainage
    - Computed tomography-guided biopsy and drainage
- Performing and reporting the following contrast medium studies:
    - Cholangiography (T-tube)
    - Sinogram
    - GI video studies
- Experience of the current application of radionuclide investigations to the gastrointestinal tract in the following areas:
    - Liver
    - Biliary system

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- Gastrointestinal bleeding (including Meckel's diverticulum)
- Abscess localization
- Assessment of inflammatory bowel disease

- Experience of the application of angiography and vascular interventional techniques to this subspecialty
- Observation of ERCP and other diagnostic and therapeutic endoscopic techniques
- Performing Percutaneous cholangiography
- Observation of Percutaneous Gastrostomy

Course content:

- Salivary glands / Pharynx / esophagus
- Stomach & duodenum
- Small intestine
- Colon
- Acute abdomen
- Biliary Tract
- Liver & Spleen
- Pancreas
- Pediatric abdomen

F) Head and Neck Imaging including ENT/dental

- Knowledge of head and neck anatomy and clinical practice relevant to clinical radiology
- Knowledge of the manifestations of ENT disease as demonstrated by conventional radiography, relevant contrast examinations, ultrasound, CT and MRI
- Awareness of the application of ultrasound with particular reference to the thyroid and salivary glands and other neck structures
- Reporting plain radiographs performed to show ENT disease
- Performing and reporting relevant contrast examinations (e.g. barium studies including video swallows, sialography and dacrocystography).
- Performing and reporting ultrasound of the neck (including the thyroid, parathyroid and salivary glands)
- Supervising and reporting computed tomography of the head and neck for ENT problems
- Supervising and reporting computed tomography for orbital problems
- Supervising and reporting magnetic resonance imaging in of the head and neck for ENT problem
- Performing biopsies of neck masses (thyroid, lymph nodes etc)
- Observation or experience in performing ultrasound of the eye
- Supervising and reporting computed tomography and magnetic resonance imaging of congenital anomalies of the ear

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Course content:

Ear nose and throat

- Pharynx & Larynx
- Salivary glands
- Paranasal sinuses
- Petrous temporal bone
- Orbit
- Teeth and jaw
- Normal appearances and congenital lesions of brain and spinal cord
- Tumors/infections. Degenerative diseases of brain and spine
- Trauma and vascular malformation

G) Musculoskeletal including osteology

- Knowledge of musculoskeletal anatomy and clinical practice relevant to clinical radiology
- Knowledge of normal variants of normal anatomy, which may mimic trauma
- Knowledge of the manifestations of musculoskeletal disease and trauma as demonstrated by conventional radiography, CT, MRI, contrast examinations, radionuclide investigations and ultrasound
- Reporting plain radiographs relevant to the diagnosis of disorders of the musculoskeletal system including trauma
- Supervising and reporting computed tomography of the musculoskeletal system
- Supervising and reporting magnetic resonance imaging of the musculoskeletal system
- Supervising CT and MR of Trauma patients
- Experience of the relevant contrast examinations (e.g. arthrography)

Course content:

- Normal Structure, physiology & metabolism
- Congenital anomalies including dysplasias
- Bone infections
- Metabolic & endocrine disorders of bone
- Bone tumours
- Disease of lymphometicular system & other haemopoietic. Disorders
- Trauma
- Disease of joints
- Misc. Bone lesions incl. AVN, Osteochondritis
- Degenerative diseases

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H) Neuroradiology

- Knowledge of neuroanatomy and clinical practice relevant to neuroradiology
- Knowledge of manifestations of CNS disease as demonstrated on conventional radiography, CT, MRI, myelography and angiography
- Awareness of the applications, contraindications and complications of invasive neuroradiological procedures
- Familiarity with the application of radionuclide investigations in Neuroradiology
- Familiarity with the application of CT and MR angiography in Neuroradiology
- Reporting plain radiographs in the investigation of neurological disorders
- Supervising and reporting cranial and spinal computed tomography
- Supervising and reporting cranial and spinal magnetic resonance imaging
- Observation and reporting of cerebral angiograms
- Observation of carotid ultrasound including Doppler
- Experience in MR angiography and CT angiography to image the cerebral vascular system
- Performing and reporting cerebral angiograms
- Performing and reporting myelograms

Course content:

- Normal anatomy and embryology of brain and spinal cord
- Congenital lesions of brain and spinal cord
- Tumors of brain & spine
- Infections & Inflammatory conditions
- Degenerative diseases of brain and spine
- Trauma involving brain & spine
- Vascular malformations of brain & spine
- Miscellaneous conditions of brain & spine

I) Obstetrics and Gynecology

- Knowledge of obstetric and gynecological anatomy and clinical practice relevant to clinical radiology
- Knowledge of the physiological changes affecting imaging of the female reproductive organs
- Knowledge of the changes in fetal anatomy during gestation and imaging appearances of fetal abnormality
- Awareness of the applications of angiography and vascular interventional techniques
- Awareness of the applications of magnetic resonance imaging in gynecological disorders and obstetrics
- Reporting plain radiographs performed to show obstetric and gynecological disorders

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- Performing and reporting transabdominal and endovaginal ultrasound in gynecological disorders
- Supervising and reporting computed tomography in gynecological disorders
- Supervising and reporting magnetic resonance imaging in gynecological disorders
- Performing and reporting hysterosalpingography
- Performing and reporting transabdominal and endovaginal ultrasound in obstetrics
- Supervising and reporting magnetic resonance imaging in obstetric applications (eg assessing pelvic dimensions)
- Observation of fetal MRI
- Observation of angiography and vascular interventional techniques in gynecological disease.

J) Oncology

- Knowledge of clinical practice relevant to clinical radiology
- Familiarity with tumour staging nomenclature
- Familiarity with the application of ultrasound, radionuclide investigations, computed tomography and magnetic resonance imaging, angiography and interventional techniques in oncological staging and monitoring the response of tumours to therapy
- Familiarity with the radiological manifestations of complications which may occur in tumour management
- Reporting plain radiographs performed to assess tumours
- Performing and reporting ultrasound, CT, MRI and radionuclide investigations in oncological staging and monitoring the response of tumours to therapy
- Performing Imaging-guided biopsy of masses under US and CT guidance

K) Paediatrics

- Knowledge of pediatric anatomy and clinical practice relevant to clinical radiology
- Knowledge of disease entities specific to the pediatric age group and their clinical
- Manifestations relevant to clinical radiology.
- Knowledge of disease entities specific to the pediatric age group and their manifestations as demonstrated on conventional radiography, ultrasound, contrast studies, CT, MRI and radionuclide investigations
- Reporting plain radiographs performed in the investigation of pediatrics disorders including trauma
- Performing and reporting routine fluoroscopic procedures in the paediatric age group, particularly:
    - Contrast studies of the urinary tract
    - Contrast studies of the gastrointestinal system

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L) Uroradiology

- Knowledge of urinary tract anatomy and clinical practice relevant to clinical radiology
- Knowledge of the manifestations of urological disease as demonstrated on conventional radiography ultrasound, CT and MRI
- Familiarity with the current application of radionuclide investigations for imaging the following:
  - Kidney
  - Renal function
  - Vescio-ureteric reflux
- Awareness of the application of angiography and vascular interventional techniques
- Reporting plain radiographs performed to show urinary tract disease
- Performing and reporting the following contrast studies:
  - Intravenous urogram
  - Retrograde pyelo-ureterography
  - Loopogram
  - Nephrostogram
  - Ascending urethrogram
  - Micturating cysto-urethrogram
- Performing nephrostomies

Course content:

Method of examination/normal appearance and congenital lesions of

- Kidney
- Adrenal
- Renal vascular disease
- Calculus diseases of urinary tract
- Genitourinary system tumors
- Urinary tract infections
- Ureters
- Bladder & Prostate
- Urethra
- Scortum, Testis & Penis

Imaging Modalities: Training Guidelines

Practical Radiography & Dark Room Procedures:

- Radiography
- Contrast technique
- Magnification technique
- Chemistry of processing & Dark Room Procedures

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Conventional Radiology

- Knowledge relevant of doing plain radiology of chest/ bones/and plain radiology of abdomen
- Understanding of the radiographic techniques employed in diagnostic mammography
- Performing all conventional radiology and contrast studies related to the uroradiology including IVU/Cystography/MCU/RGU/ HSG
- Performing all conventional radiology and contrast studies related to gastrointestinal tract as Ba swallow/ Ba meal follow through/ Ba Enema/ small bowel enema and tube cholangioraphy

Ultrasound

- Performing routine USG of abdomen, pelvis, neck
- Experience of performing Doppler ultrasound imaging (e.g. leg veins, portal vein, carotid artery)
- Performing ultrasound of the breast, thyroid /scrotum
- Experience in Ultrasound of the musculoskeletal system
- Performing ultrasound-guided interventional procedures (e.g. biopsy and drainage

Computed Tomography

- Knowledge of the technical aspects of performing computed tomography (CT), including the use of contrast media
- Knowledge of the cross-sectional anatomy as visualized on computed tomography
- Practical experience in supervision including vetting requests, determining protocols, the examination and post processing and reporting of the examination in the following anatomical sites:
  - Brain
  - Head and Neck
  - Chest
  - Abdomen and Pelvis
  - Musculoskeletal
  - Vascular
- Experience in performing computed tomography-guided procedures, e.g. biopsy and drainage
- Familiarity with the application of CT angiography
- Familiarity with post image acquisition processing

Vascular and Vascular Intervention

- Knowledge of vascular anatomy and clinical practice relevant to clinical radiology

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- Familiarity with the indications, contraindications, pre-procedure preparation (including informed consent), sedation, patient monitoring during procedures and post-procedure patient care
- Familiarity with procedure and post-procedure complications and their management.
- Femoral artery puncture techniques, and the introduction of guide wires and catheters into the arterial and venous system
- Observation of various diagnostic vascular procedures

Magnetic Resonance Imaging

- Understanding of current advice regarding the safety aspects of magnetic resonance imaging (MRI)
- Knowledge of the basic physical principles of magnetic resonance imaging, including the use of contrast media
- Knowledge of the cross-sectional anatomy in orthogonal planes, and the appearance of normal structures on different pulse sequences
- Experience in supervision including requests, determining protocols, the examination, and post processing and reporting of the examination in the following anatomical sites:
    - Brain & Spine
    - Head and Neck
    - Chest
    - Abdomen and Pelvis
    - Musculoskeletal (e.g. hips, knees, shoulders, and extremities)
- Experience of the application of MR angiography and venography
- Familiarity with post imaging acquisition processing

Interventional Radiology

- Familiarity with the equipment and techniques used in vascular, biliary, and renal interventional techniques
- Familiarity with the indications, contraindications, pre-procedure preparation including informed consent, patient monitoring during the procedure and post-procedure patient care
- Familiarity with procedure and post-procedure complications and their management
- Performing nephrostomies
- Ultrasound-guided interventional procedures (e.g. biopsy and drainage)
- Computed tomography-guided interventional procedures (e.g. biopsy and drainage)
- Performing Digital subtraction angiography
- Observation of the spectrum of interventional procedures currently performed in the following systems:
    - Vascular system (including neurovascular))

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- Urinary system
- Biliary system
- Gastrointestinal system
- Musculoskeletal system

Radionuclide Radiology

- Knowledge and understanding of the principles and indications of the more commonly performed radio nuclide investigations and how these relate to other imaging modalities, in particular knowledge of the radio nuclide investigations in the following topic areas:
  - Cardiology
  - Endocrinology
  - Gastroenterology and Hepato-biliary disease
  - Hematology
  - Infection
  - Lung disease
  - Nephro-urology
  - Nervous system
  - Oncology
  - Paediatrics
  - Skeletal disorders

- Understanding the significance of normal and abnormal results
- Knowledge of the strengths and weaknesses of radio nuclide investigations compared to other imaging modality
- PET CT

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