MMRIT 3rd Semester

Course Title: Quality Assurance and Quality Control in Diagnostic Radiology and Imaging			
Semester: III	**Course code: MRT -301**	**Credits:07**	**Core**
No of sessions Lectures / Tutorial: 60		**No of practical hours: 60**	
Course Pre-requisites:		**Number of sessions: 90**	

Course Objectives

ThiscourseisdesignedtoprovidethestudentsthebasicknowledgeinRadiography.At the end of the course, the student should be able to:

1-Radiation protection

2-Biological effects of radiation

3-Planning of radiation installation-protection primary &secondary radiation

4-Personnel monitoring systems

Course learning Outcomes

CLO 1-Enumerate the guidelines of all respective organization. Enumerate the risk and effects of the radiation.

CLO 2-Label & demonstrate how to use and care of all types of lead aprons

CLO 3-Demonstrate the handling and how to use TLD's and badges as per guidelines

Course contents-

1. Objectives of Quality Control: Improve the quality of imaging thereby increasing the diagnostic value; to reduce the radiation exposure; Reduction of film wastage and repeat examination;to maintain the various diagnostic and imaging units at their optimal performance.
2. Quality Assurance activities: Equipment selection phase; Equipment installation and acceptance phase; Operational phase; Preventive maintenance.
3. Quality assurance programme in the radiological faculty level: Responsibility; Purchase; Specifications; Acceptance; Routine testings; Evaluation of results of routine testings; Quality assurance practical exercise in the X ray generator and tube; Image receptors from processing; Radiographic equipment; Fluoroscopic equipment; Mammographic equipment; Conventional tomography; Computed tomography; Film processing, manual and automatic; Consideration for storage of film and chemicals; Faults tracing; Accuracy of imaging- image distortion for digital imaging devices. LASER printer calibration
4. Quality assurance programme tests: General principles and preventive maintenance for routine, daily, weekly, monthly, quarterly, annually – machine calibration. Basic concepts of quality assurance – LASER printer - Light beam alignment; X-ray out-put and beam quality check; KVp check; Focal spot size and angle measurement; Timer check; mAs test; Grid alignment test; High and low contrast resolutions; Mechanical and electrical checks; Cassette leak check; Proper screen-film contact test; Safe light

test; Radiation proof test; Field alignment test for fluoroscopic device; Resolution test; Phantom measurements - CT, US and MRI.

5. Quality assurance of film and image recording devices:Sensitometry; Characteristic curve; Film latitude; Film contrast; Film speed Resolution; Distortion; Artifacts of films and image recording. Monitor calibration. SMPTE pattern.
6. Maintenance and care of equipment:Safe operation of equipment; Routine cleaning of equipment and instruments; Cassette, screen maintenance; Maintenance of automatic processor and manual processing units; Routine maintenance of equipments; Record keeping and log book maintenance; Reject analysis and objectives of reject analysis programme.
7. Care and maintenance of diagnostic equipment: General principles and preventive maintenance for routine - daily, Weekly, monthly, quarterly, annually: care in use, special care of mobile equipment.
8. Quality Assurance and quality control of Modern Radiological and Imaging Equipment which includes Digital Radiography, Computed Radiography, CT scan, MRI Scan, Ultrasonography and PACS related. Image artifacts their different types, causes and remedies.

Course Assessment:

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, make charts and posters, make models, and conduct quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Books Recommended-

Clark's Radiography- Clark / Text book of radiology for residents and technicians- s k bhargava
Radiographic positioning- Garkal
Radiology- Special investigation – champman.
www.wikipedia.co.in // www.radiopedia.co.in

Course Title: Intervention Radiological Techniques and Care of Patient			
Semester: III	**Course code: MRT -302**	**Credits:07**	**Core**
No of sessions Lectures / Tutorial: 60		**No of practical hours: 60**	
Course Pre-requisites:		**Number of sessions: 90**	

Course Objectives-

This course is designed to provide the students the basic knowledge in systematic investigations with using contrast media and image intensifier.

Course learning outcomes-

CLO 1- Explain indication, contraindication and reactions of contrast media Demonstrate how to take in minimum numbers of exposures in each special investigation.

CLO 2-Demonstratethe positioning and technique of the special studies**.**

CLO 3-Explainthe technique of all GIT study according to investigation.

CLO 4- Demonstrate surface anatomy. To be able to know the technique behind the radiography.

Course contents

1. Basic Angiography and DSA:

   History , technique, patient care, Percutaneous catheterization, catheterization sites, Asepsis ,Guide wire, catheters, pressure injectors, accessories, Use of digital subtraction- single plane and bi-plane.

   All forms of diagnostic procedures including angiography, angioplasty, biliary examination, renal evaluation and drainage procedure and aspiration cytology under flouro, CT,US,MRI guidance.
2. Central Nervous System: Myelography.Cerebral studies, Ventriculography.
3. Arthrography: Shoulder, Hip, Knee, Elbow
4. Angiography:Carotid Angiography (4 Vessel angiography).Thoracic and Arch Aortography. Vertebral angiography, femoral arteriography. Selective studies: Renal, SMA, Coeliac axis. Angiocardiography.
5. Venography: Peripheral venography,Cerebral venography, Inferior and superior venocavography. Relevant visceral phlebography.
6. Cardiac catheterization procedures: PTCA, BMV, CAG, Pacemaker.
7. Microbiology Introduction and morphology - Introduction of microbiology, Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria. Growth and nutrition -nutrition, culture media, types of medium with example and uses of culture media in diagnostic bacteriology, antimicrobial sensitivity test.Sterilization and disinfection - principles and use of equipments of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization, anti-septic and disinfectants.

Care of Patient in Interventional Radiology

1. Introduction to patient care: responsibilities of healthcare facility-responsibilities of the imaging technologist.
2. General patient care, patient transfer technique-restraint techniques-aspects of patient comfort-specific patient conditions-security of patient property-obtaining vital signs-laying up a sterile trolley-assisting in IV injection.
3. Surgical Asepsis: The Environment and Surgical Asepsis, Methods of Sterilization, Disinfection, Opening Sterile Packs, Changing Dressing.
4. Nursing procedure in radiology- general abdominal preparation, clothing of the patient-giving an enema-handling the emergencies in radiology- first aid in the X-ray department
5. Patient care during investigation: GI tract, biliary tract, respiratory tract, Gynecology, cardiovascular lymphatic system, CNS etc.
6. Infection control: definitions- isolation techniques-infection sources-transmission modes- procedures-psychological considerations – sterilization & sterile techniques.
7. Patient education: communication – patient communication problems – explanation of examinations-radiation safety/protection – interacting with terminally ill patient.
8. Medical Emergencies: Shock, Pulmonary Embolus, Diabetic Emergencies, Respiratory Failure, Cardiac Failure, Airway Obstruction, Stroke, Fainting, Seizures.
9. Drug Administration: System of Drug Administration, Medication Error and Documentation, Equipment for Drug Administration, Methods of Drug Administration, Care of patient with Intravenous Infusions

Course Assessment:

Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, make charts and posters, make models, and conduct quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Reference and Text Books-

Clark's Radiography- Clark / Text book of radiology for residents and technicians- s k bhargava
Radiographic positioning- Garkal
Radiology- Special investigation – champman.www.wikipedia.co.in //**www.wikiedia.co.in**

Course Title: Newer Developments in Advanced Imaging Technology and Biostatics.			
Semester: IV	**Course code: MRT 303**	**Credits:07**	**Core**
No of sessions Lectures / Tutorial: 60		**No of practical hours: 60**	
Course Pre-requisites:		**Number of sessions: 90**	

Course Objectives

ThiscourseisdesignedtoprovidethestudentsthebasicknowledgeinRadiography with patient care and code of ethics. At the end of the course, the student should be able to

Course Learning Outcomes

CLO1- Understood about Introduction to hospital staffing and Medical records and documentation.

CLO2 – Must know about Legal issues and Professional ethics.

CLO3- How to handle and must know Departmental Safety and Infection control

CLO4- Understood Body mechanics and transferring of patient

Course Pedagogy

The course will use the mixed technique of interactive lectures, regular assignments and practicing numerical. Teaching in this course is aimed to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day-to-day real world applications. It will not only help students to understand the fundamentals of applied physics but also improve skills and techniques for tackling practical problems.

Course contents

1. In addition to existing Radiological and Imaging Modalities -Newer Developments in Digital Imaging CT,MRI,US and any other modality.
2. Newer Radiological and Imaging Equipment: including Computed radiography: Digital Radiography, Digital Fluoroscopy, Digital Mammography and DSA - Introduction to Newer Technology innovations, software and its applications.
3. Computed Tomography Introduction to Newer Developments/ Newer Technology innovations, software and its applications.
4. MRI Introduction to Newer Developments/Newer Technology innovations, software and its applications.
5. Advanced Ultrasonography Newer Developments/Newer, Technology innovations, software and its applications.Elastography, HIFU, ABVS etc.
6. Fusion Imaging -PET CT & PET MRI
7. Tele-radiology,HIS,RIS,PACS,Imaging processing and archiving.

Biostatistics & Basic Research Methodology

1. What is statistics – importance of statistics in behaviors sciences- descriptive statistics and inferential statistics-usefulness of qualification in behavioral sciences – scales of measurements- nominal, ordinal, interval and ratio scales.

2. Data collection – classification of data-class intervals – continuous and discrete measurements-drawing frequency polygon-histogram-cumulative frequency curve-ogives-drawing inference from graph.
3. Measures of central tendency- need-types: mean, median, mode – working out these measures with illustrations. Measures of variability – need- types range, quartile deviation, average deviation, standard deviation, variance-interpretation.
4. Normal distribution-general properties of normal distribution-theory of probability-illustration of normal distribution-area under the normal probability curve. Variants from the normal distribution-skewness-quantitative measurements of skewness-kurtosis- measurements of kurtosis-factors contributing for non-normal distribution
5. Correlation-historical contribution-meaning of correlation-types: rank correlation, regression analysis.

Tests of significance- need for-significance of the mean-sampling error-significance of differences between means-interpretation of probability levels-small samples-large samples-inferential statistics-parametric and non-parametric methods-elements of multivariate analysis

Course Assessment:
Students would be assessed continuously throughout the semester in the form of continuous evaluation. Periodic tests and surprise tests will be conducted. Students will have to submit written assignments, make charts and posters, make models, and conduct quiz for the topics. Practical will be conducted with viva. Midterm and end term evaluation will be done theoretically and practically. Students will also be assessed on the basis of presentations of various topics.

Reference and Text Books:

Text book of radiology for residents and technicians- S K Bhargava.

Text book of Radiation physics.

www.wikiedia.co.in

Course Title: **Residency – I**			
Semester: III	**Course code: MRT – 314**	**Credits:01**	**Core**
No of sessions Lectures / Tutorial: 00		**No of practical hours: 80**	
Course Pre-requisites:		**Number of sessions: 40**	

1. Course Introduction

To demonstrate the students of bachelor level and patient handling method of various aspects the importance of sterilization and proper disposals is only way to prevent it. Well known sayings, prevention is better than cure, the main objective of this course is to focus mainly on the preventive measures and quality assurance to the patients. This course emphasizes more on risk management principles and safe handling of disposals, basic emergency care and basic life support skills which can prove remedy in emergency cases.

2. Course Objectives: The main objective of this course is to teach students quality measures to provide patients with effective methods of treatment with more focus on proper handling of infected specimens and proper treatment with best sterilized and disinfected means to reduce the cross-infection scenario and nosocomial infections, which occurs due to poor handling of infected specimens and improper disposal means polluting environment too. Students are made to learn basic concepts of quality in health care and develop skills to implement sustainable quality assurance program. Introducing students to basic emergency care, infection prevention& control with knowledge of biomedical waste management and antibiotic resistance.

3. Course Learning Outcomes

Upon successful completion of the course, the students should be able to:

CL01: Understood quality improvement approaches, NABH, NABL,guidelines which purely focuses on the quality measures and proper handling of disposals providing quality facility to patients. (Understanding Based)

CL02: Understood basic life support skills which can save many lives in urgent cases. (Applying Based)

CL03: Understood proper disposals of biomedical waste, reducing risk of infection to waste handling personnel and cross infection which can occur due to improper handling of infected waste polluting surroundings too. (Applying Based)

CL04: Understood effective hand hygiene, prevention and control of common health care associated infections. (Remembering Based)

CL05: Understood fundamentals of emergency management, disaster preparedness. (Remembering Based)

4. Course Pedagogy

This course will use mixed technique of interactive lectures, digital learning methodologies, regular assignments and power point presentations. Students will be made to prepare project reports by interacting directly with laboratory personnel and visits to hospital to engage the students in strengthening their conceptual foundation and applying the knowledge gained to different day to day real world applications. This course will focus mainly on applying based methodologies, students will not be made limited to theory only, but hands on practices and

analyzing every aspect of the module by themselves.

Course Contents

In the residency the professional is expected to work and contribute in the medical imaging unit.

Course Assessment:

Continuous evaluation by faculty in-charge of the department.

Recommended book

Clark's Radiography-
Clark Radiographic positioning- Garkal
www.wikipedia.co.in
www.radiopedia.co.in