Introduction:
Radiology is a medical specialization that uses imaging for diagnostic and therapeutic purpose. The typical radiological tests are X-ray, Ultrasound, Color Doppler, CT, MRI, PET-CT, Nuclear medicine studies and Interventional radiology procedures.

Radiology curriculum deals with the basic physics of particular imaging modality, normal and abnormal imaging appearances on that modality. During the process of radiology training and education the radiologists thereby acquire necessary skills and knowledge regarding the various imaging modalities. The training pattern and rotation remains the same, what changes in the duration of the course, rotation in other departments but specific to radiology within the hospital and patterns of internal and external assessment.

However there is a deficiency in the current pattern. The deficiency is rapidly increasing due to rapid changes in technology sweeping the radiology world. The hospital administrator looks upon the radiologist within the hospital to guide him regarding technology upgrades. This requires the radiologist to be continuously be updated regarding the recent technology in the market at that point of time and its impact in the future. This therefore requires the radiologist to be one step ahead in his knowledge regarding the technological upgrades in the field of radiology. Therein lies the need for “radiology informatics”.

Definition:
Radiology Informatics studies the role of computing technologies in analysis, retrieval and transfer of information within the images and associated documentation within the healthcare network.

Synonyms:
Medical Imaging
Radiology
medical imaging, science, medicine

Components:
Radiology
limited to the
1. DICOM,
2. PACS
3. Data Mining

Informatics, Biomedical Informatics. Informatics is the amalgamation of biomedical informatics, computer and medical physics (Figure 1.)

Informatics constitutes however not following:
4. Cloud Computing
5. Vendor Neutral Archives
6. Teleradiology
7. Radiology and Hospital Information Systems
8. Imaging standards like HL7 and HIPAA.
9. Image post processing, 3D and other reconstructions.
10. Electronic Health Records
11. Workstation and imaging facility design and planning.

Digital Imaging and Communications in Medicine (DICOM). It facilitates inter-operability of medical imaging. DICOM describes hardware specification, necessary software commands and pertinent set of data formats to ensure standardization in the medical imaging enterprise.

Picture Archiving and Communication Systems (PACS) is responsible for short and long term storage, retrieval, management, distribution and presentation, display of medical images. PACS is all about work flow. The basis of PACS is DICOM. Typically PACS has four components: Imaging systems where images are generated, secure network for image transfer, workstations for viewing, processing and interpreting images and archives for storage and retrieval of images and reports.

Data Mining in Radiology facilitates the study of radiology data in various dimensions. The components of data mining are data, Information and knowledge (Figure 2). It converts the patient image and text datasets into useful information that can potentially help in improving patient care and provide informative reports. Data mining allows radiologist to understand concealed patterns in data contained in the departmental and/or hospital database of clinical, radiological, and laboratory reports. Data mining can assist radiologist to make definitive diagnosis and, therefore, direct the physician toward effective treatment.

Cloud computing in process which facilitates resources such as hardware, on a pay-per-computer grid created Radiologists can multimodality imaging to latest software and paying huge upfront costs. Cloud computing can work on public, private, hybrid, or community design (Figure 3). Using the various components of a Cloud, such as applications, client, infrastructure, storage, services, and processing power, Cloud computing can assist imaging units rapidly scale and rescale operations and thereby avoid
huge spending on maintenance of costly applications and storage. Cloud computing gives the required flexibility to imaging. Cloud computing makes radiology virtual. Cloud computing needs to address concerns regarding security and privacy success.

**Vendor in Radiology** records, non-DICOM documents DICOM and non-DICOM which can be migrated between various PACS. A VNA uncouples the PACS and workstations during the process of archival allowing data migration. This benefits by lowering healthcare costs and effective time utilizations. VNA are also known by other names such as “architecture neutral,” “PACS neutral,” “content neutral,” and “third-party neutral”. VNA can be considered as an application process that handles the data of a vendor and at rapid speed. It is positioned between the modality and the PACS. Radiologists need to be aware of its impact in PACS across the globe.

**Teleradiology** (Figure 4) is a process of transmission of radiological patient images from one location to another for the purposes of reviewing and reporting and sharing studies with other imagiologists. Teleradiology utilizes internet, wide area network (WAN), local area network (LAN) and cloud based computer technology. Teleradiology enables rapid and prompt patient care by allowing Radiologists to provide services without actually be physically present at the location of the patient. Imagists can provide a stat reads, preliminary Read for emergency room cases or a Final Diagnostic Read for the official patient record. Teleradiology can be available for intermittent coverage, overflow studies coverage as an extension of practices and will provide patients with the highest quality care.

**Radiology and Hospital and HIS** are complex by radiology departments store, manipulate, and other related data. systems include: tracking, scheduling, tracking, RIS Information Systems).

**Neutral archives (VNA)** is a collection of related documents DICOM and which can be migrated between various PACS. A VNA uncouples the PACS and workstations during the process of archival allowing data migration. This benefits by lowering healthcare costs and effective time utilizations. VNA are also known by other names such as “architecture neutral,” “PACS neutral,” “content neutral,” and “third-party neutral”. VNA can be considered as an application process that handles the data of a vendor and at rapid speed. It is positioned between the modality and the PACS. Radiologists need to be aware of its impact in PACS across the globe.

**Information Systems (RIS)** electronic database used and hospitals respectively to distribute patient radiological Components of these modules for patient result reporting and image complements HIS (Hospital These systems are
important as they insure efficient workflow to radiology practices and various departments within the hospital.

**Health Level 7 (HL7)** provides standards for interoperability thereby improving care delivery, optimizing workflow, reducing ambiguity and enhancing knowledge transfer. "Level Seven" refers to the seventh level of the International Organization for Standardization (ISO) seven-layer communications model for Open Systems Interconnection (OSI).

**The Health Insurance Portability and Accountability Act of 1996 (HIPAA)** was enacted by the United States Congress and signed in 1996. HIPAA assists in health insurance coverage for workers and their families when they change or lose their jobs. HIPAA requires the establishment of national standards for electronic health care transactions. This act gives the right to privacy to individuals under 18, but at or above 12.

**Post-processing, 3D and other reconstructions** involve manipulation of radiographic images to acquire additional qualitative or quantitative data. This data enhances not only our diagnostic content, but can assist in treatment planning. A dedicated image post processing laboratory can ensure seamless availability to imagiologists of high-quality, reproducibility images.

An **electronic health record (EHR)** is a systematic compilation of electronic health information and records about an individual patient. The record is digital and can be shared across different health care settings. Data can be shared by way of network-connected, enterprise-wide information systems. A typical EHR data consist multitude data such as personal statistics, demographics, medical history, medication, allergies, immunization status, laboratory test results, radiology images, billing information.

**Conclusion:**
Radiology Informatics is growing leaps and bounds. It is transforming radiology at an extremely rapid pace. Radiologists need to be abreast with changing technology to make informed decisions which can have a major impact on planning and execution of imaging activities in the department. Radiology Informatics beyond DICOM and PACS need to be a part of standard radiology curriculum, thereby widening the knowledge of budding radiologists, ensuring their adequate participation in decision making, designing and implementing cost effective healthcare and thereby ensuring “meaningful use” of technology.

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