

**Summer Training at
Aditya Birla Memorial Hospital, Pune
(April 7–June 6, 2014)**

- **Radiology Department Equipment Utilization Study**
- **Study on Dispatch of Reports in Radiology Department**

**By
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**Under the guidance of
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**MBA- Hospital & Health Management (MBA-HM)
2013-2015**



**The IIHMR University, Jaipur
2014**

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CERTIFICATE

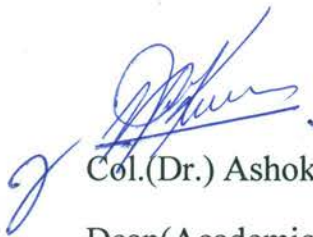
This is to certify that **Dr.Pravin Patil** has undergone his summer training in **Aditya Birla Memorial Hospital, Pune** from 7st April, 2014 to 6th June, 2014. The candidate himself carried out below mentioned studies related to his summer training. His approach to the study has been scientific and analytical.

Studies are:-

1. Radiology Department Equipment Utilization Study
2. Study on Dispatch of Reports in Radiology Department

The summer training is partial fulfilment of the course requirement recommended for the award of Post Graduate Diploma in Hospital and Health Management.

I wish his success in all his future endeavours.



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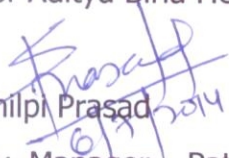
6th June 2014

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Pravin Patil** has successfully completed his internship project on "**A study on Radiology department equipments utilisation**" in **Radiology Department** from **7th April 2014 to 6th June 2014**.

We wish him "All the Best" in his future endeavor.

For Aditya Birla Health Services Limited,


Shilpi Prasad

Dy. Manager – Patient Services


Sandeep Bhangare

Manager – HR & Admin.



ADITYA BIRLA HEALTH SERVICES LIMITED

MAHARASHTRA'S FIRST NABH AND JCI ACCREDITED HOSPITAL

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Acronyms/ Abbreviations

- ABMH- Aditya Birla Memorial Hospital
- AERB- Atomic Energy Regulatory Board
- ALARA- As Low As Reasonably Achievable
- A & E- Accident and Emergency
- BARC- Bhabha Atomic Research Centre
- BMD- Bone Mineral Density
- BME- Biomedical Engineering
- COO- Chief Operating Officer
- CT- Computed Tomography
- CSSD- Central Sterility Store Department
- HACCP- Hazard Analysis and Critical Centre Point
- HR- Human Resource
- HIS- Hospital Information System
- IRCP- International Commission on Radiological Protection
- IPD- In Patient Department
- ISO- International Organization for Standardization
- JCI- Joint Commission International
- MRI- Magnetic Resonance Imaging
- NABH- National Accreditation Boards for Hospitals
- NABL- National Accreditation Boards for Hospitals
- OPD- Out Patient Department
- PACS- Picture Archiving and Communication
- RIS- Radiology Information System
- RPR- Radiation Protection Rule
- TLD- Thermo Luminescent Dosimeter
- USG- Ultra Sonography

About ABMH

Aditya Birla Memorial Hospital (ABMH) is a multi-specialty medical centre located at Pimpri-Chinchwad, Pune. The quaternary healthcare centre provides high quality and cost-effective medical services. A tribute to the visionary founder of the Aditya Birla Group, the hospital fulfils the late Mr. Aditya Vikram Birla's dream of building a world-class healthcare facility in India. It is the first and only hospital in Pune to have coveted JCI (Joint Commission International) accreditation in addition to NABH, ISSO and NABL accreditation. It is a 500 bedded hospital with which was incorporated in the year 2006. It is a private limited organization and Mrs. Rajashree Birla, chairperson of the Aditya Birla Foundation, is personally steering this project. Oncology centre is one of its major milestones of expansion.

Vision:

Excellence first and always

Mission:

Compassionate quality healthcare

- The hospital is committed to maintain the highest standard of care and respond to the needs of the community in a compassionate manner.
- To provide state-of-the-art, high quality and cost-effective healthcare services and latest information to improve and maintain health for the well-being of the community.
- To unrelentingly pursue the creation of value for our customers, shareholders, employees and society at large
- To foster a therapeutic relationship based on compassion that is felt, quality that is measurable and cost that is affordable.
- To become partners in health promotion with every section of society.
- Super specialty services

Cardiology and Cardiovascular thoracic surgery	Pain Management
Neurology and Neurosurgery	Oncology
Orthopaedics & Joint Replacement	Haematology
Gastroenterology	Internal medicine
Minimal Invasive Surgery	Endocrinology
General surgery	Accident and Emergency
Paediatrics & Neonatology	Physiotherapy
Obstetrics and Gynaecology Infertility Clinic	Radiology
Intensive Care	Bone Marrow Transplant Unit
Dietetics	Transfusion Medicine
Nephrology	Plastic surgery
Urology	Dentistry
Ophthalmology	Pulmology
Telemedicine	Preventive Medicine
ENT	Pathology
Blood Bank	Rheumatology

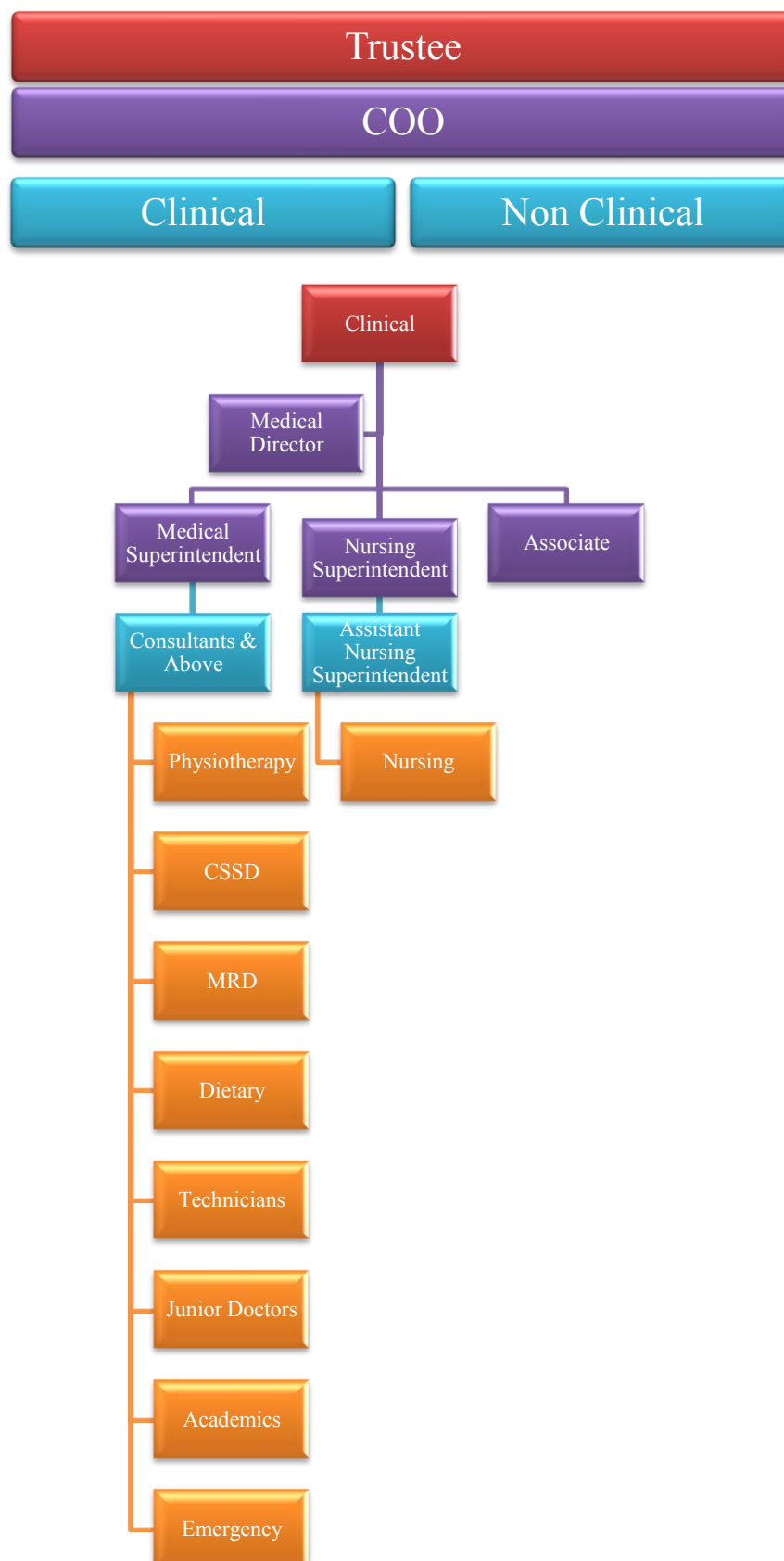
The hospital is constructed in a plot size of 53,000 square meters and the covered area of the building is 35,820 square meters. There are two buildings in the hospital one for OPD and one for IPD which are joined by atrium in the centre. In the OPD building there is ground plus 2 floors where as in IPD building there is basement plus ground plus 4 floors. There is a single basement which is having non-clinical departments like laundry, finance, HR, CSSD, Mortuary, Store and purchase etc in the IPD building. Parking space is well organized with staff parking at the basement with a space of 4,000 square meters and a separate paid parking, with a space of 6,000 square meters is provided for patients with in the hospital premises. There are 14 lifts in the hospital with a capacity of 26 people in each lift. Number of stair cases are 4 and there is one ramp for material access. Other amenities like cafeteria, coffee vending shop, stationary shop, garment shop, photocopy shop; ATM and Idol of Lord Ganesha are present in the atrium. Aditya Birla Memorial Hospital is a quaternary health care centre with 18 specialties. It has got numerous accreditations like JCI (Joint Commission International), NABH (National Accreditation Board for Hospitals), ISSO, NABL (National Accreditation Board for Laboratories). There are a total of 500 beds in the hospital with around 350 functional beds. Wards are broadly divided into Gold Male, Gold Female, Gold paediatric, Gold plus, Platinum,

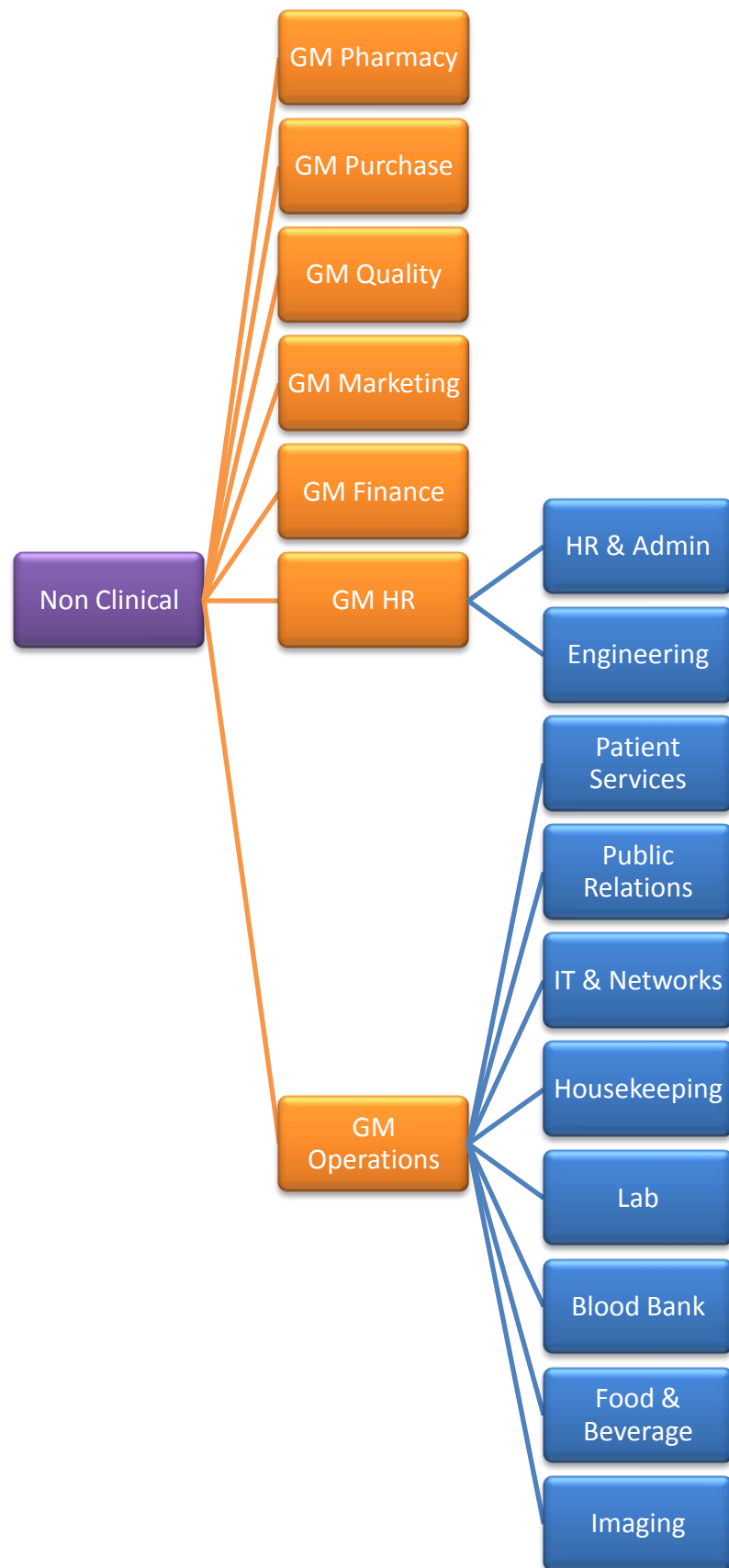
Emerald, Ruby Deluxe, Sapphire and Diamond suits with different bed charges, consultant, nursing charges etc. Few departments are out sourced like laundry, housekeeping, security, engineering, canteen etc in which only man power is outsourced but the infrastructure is provided by the hospital.

Awards and Achievements



ORGANOGRAM OF ADITYA BIRLA MEMORIAL HOSPITAL





Radiology Department

Introduction:

Aditya Birla Memorial Institute of Radiology and Imaging is equipped with latest high end imaging technology equipment to provide excellent quality diagnostic images. The radiology department has the Picture Archiving and Communication System (PACS) with remote viewing and reporting facilities. Unique to this hospital's imaging services is that the consultant radiologist attends and reports all the in-hospital as well as OPD emergency scans at any hour on all days personally, facilitating immediate management.

Radiology department is "A part of the hospital with allotted facilities and medical and other staff in sufficient numbers, with regularly scheduled hours, to provide care to patients who are not registered as in patients".

A well managed radiology services ensures not only a good relation, but also enhances the patient flow to the hospital. It also results in cost reduction and helps the hospital to become more economical.

Patient coming to radiology are –

1.General Outpatients.

- Appointment Patients.
- Walk-in Patients

2.Emergency Outpatients

- Patient come with severe illness/injury needs emergency treatment.

3.Referred Outpatients

- Patient referred by other doctor/Hospital for specific diagnostic or treatment procedures or opinion to be done as outpatient

Radiology department of Aditya Birla Memorial Hospital, a major branch, which caters to all other important clinical branches, is situated on ground floor near accident and emergency ward, is divided into two wings.

First wing:

It consist of following things

- Reception Desk
- Waiting Area

- X ray Room
- Fluoroscopy Room
- USG Room
- Mammography Room
- Computer Radiography Room
- Reporting Room
- Wash Room
- Store Area

Reception Desk:

It is situated at the entrance from atrium side. Which helps to provide guidelines, inquire, billing of the procedure, dispatching reports, receiving calls.

Waiting Area:

Huge space with seating capacity of 50 seats with central AC

Having facilities like TV Screen, fire extinguisher, CCTV camera

X ray and Fluoroscopy Room:

X ray room and fluoroscopy room are attached with each other by console room, having different entrance for both rooms. These doors are having coding system. For X ray and fluoroscopy room separate changing room, wash room and store room are available.

USG Room:

This room size is 200 sq. Meter contain USG Machine with examination bed, desk, chairs, and computer. Also there is changing room for patient.

Mammography Room:

Mammography room contain Mammography Machine with operating system and protection. Here also changing room for patient. Door has code system lock. This room size is 100 sq. Meter.

Computer Radiography Room:

This room is used for printing X ray films which contain printer and also used for keeping all record of radiology department contain shelf.

Reporting Room:

This room is used by Radiologist for viewing the images, to interpret results and to dictates report to transcriptionist. Room size is 100 sq. Meter.

Store Area:

This area is used to keep extra things such as portable X Ray Machine, Bed and Wheel Chair.

Second Wing

This wing is situated opposite of first wing divided by corridor. This wing is separately built for CT and MRI. It has following availabilities.

- Waiting Area
- Reception Desk
- Reporting Room
- Changing Room
- Rest Area
- CT Scan Room
- MRI Scan Room
- Consol Room
- BMD Room
- Wash Room

Waiting area:

Big space with fresh light has occupancy of seat. Available facilities are central AC, TV screen, fire Extinguisher, CCTV camera at entry gate, wall paintings.

Reception Desk:

It is situated at front of main entry gate of second wing. There is separate reception desk for CT, MRI.

Rest Area:

This area has contained 3 beds with separate plugs, oxygen outlet, surrounded by curtains with attached wash room. This area is used for patients before or after procedure to take rest.

CT, MRI, Consol Room:

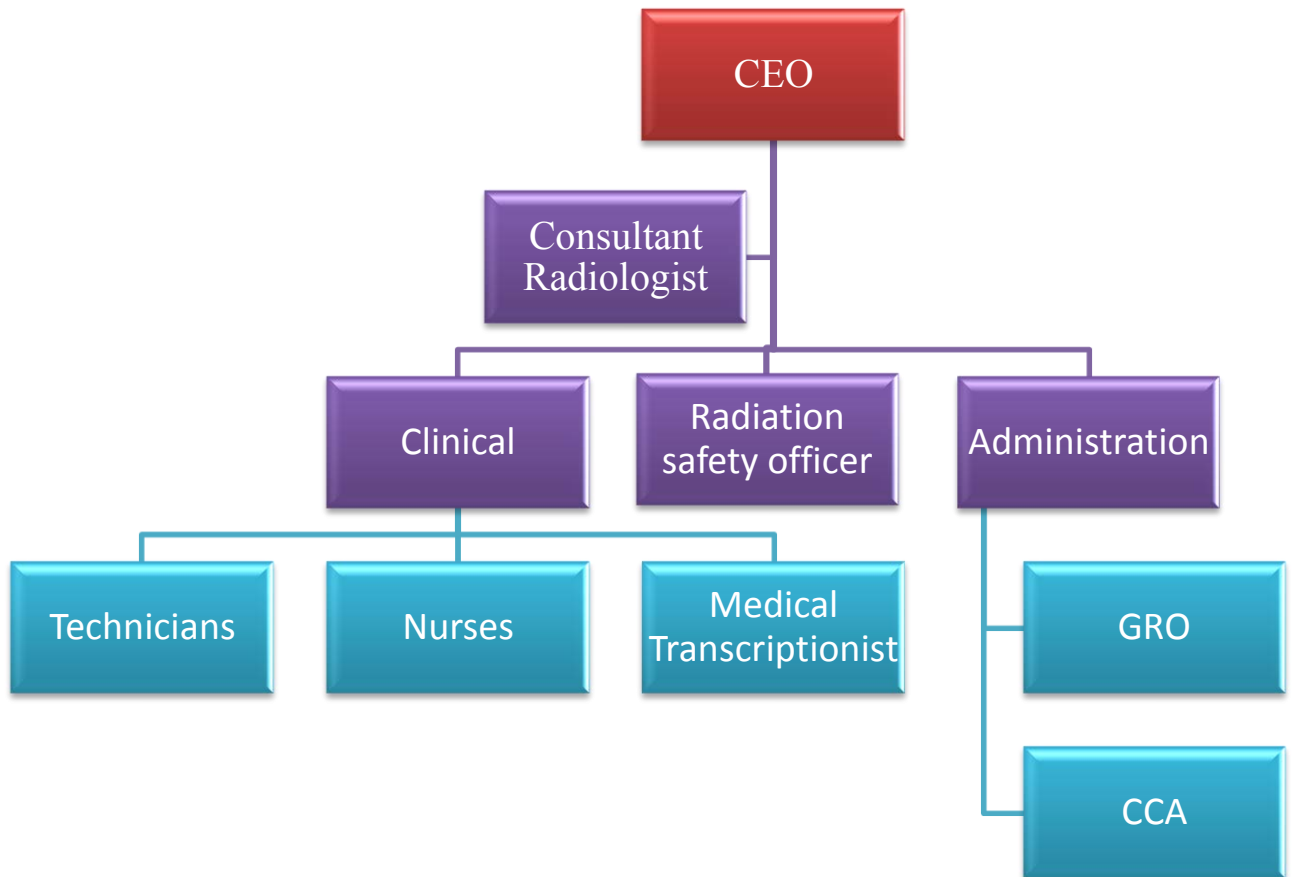
CT room and MRI room are attached by consol room. CT and MRI room doors are having code system lock which opened by identity card of employee of ABMH. These rooms are occupied by the CT, MRI Machines and its accessories.

BMD Room:

BMD room contain Bone Mineral Density Machine with operating computer. Door has code system lock. This room size is 150 sq. Meter. This room is also used for keeping record papers of CT, MRI and BMD procedures.

ORGANOGRAM OF RADIOLOGY

DEPARTMENT



Facilities Available In Radiology dept., **ABMH**

Aditya Birla Memorial Hospital's radiology and imaging department offers high-quality assessments and treatments by using the latest radiological, diagnostic, and therapeutic imaging technologies and equipment deployed by a dedicated, multidisciplinary staff of clinical experts. Some of the key services offered are highlighted below.

Magnetic Resonance Imaging (MRI)



At Aditya Birla Memorial Hospital offers:

- Advanced imaging technology, including a Siemens MRI scanner, 1.5 Tesla
- Highly trained staff to scan patients
- Soothing ambience in the department to comfort patients and help reduce claustrophobia and nervousness

Using MRI scans, a patient with a neurological or spinal problem can be

quickly and accurately assessed. The high-quality equipment at Aditya Birla Memorial Hospital offers:

- Improved image quality for more accurate interpretation
- More rapid image processing for speedier scans and results
- Ability to pinpoint exact anatomical locations for scans, allowing for pinpoint accurate brain, spinal and other parts of body scans etc.

Proper treatment of most brain, spinal and other parts problems begins with an accurate diagnosis, which depends on the highest quality of MRI equipment and expertly trained technicians and radiologists.

Computed Tomography (CT) Scan



The CT scanner provides:

- Sharp, accurate visualization of the blood vessels in and around the brain and spine
- Perfusion assessment or how much oxygen is present in tissue or tumours
- Angiography
- Coronary vessel assessment, offering a non-invasive method of diagnosing possible ischemic heart disease
- Bolus tracking for drug studies
- Biopsies
- Diagnosis of many conditions, including stroke and ischemic disease
- Percutaneous procedures, including vertebroplasties
- Whole-body scans for a comprehensive physical check-up

Multi-Purpose Digital X-Ray Machine



The multi-purpose digital x-ray machine provides:

- Routine radiography
- Digital fluoroscopy during certain procedures

Ultrasound Machine



Aditya Birla Memorial Hospital relies on ultrasound equipment to provide routine ultrasound examinations of the abdominal and retroperitoneal areas of the body, but our ultrasound team can also provide:

- Vascular studies
- Trans cranial Doppler assessment for visualisation of intracranial blood vessels
- Colour analysis of extra cranial cervical carotid and vertebral arteries for diagnosis and treatment of ischemic stroke
- Peripheral vascular studies

LIST of EQUIPMENT in RADIOLOGY

Equipment	Make /Model
CT scan	Siemens, MDCT system cardiac Somatom sensation 64 slice.
MRI	Siemens, magneto Avento 1.5 tesla with TM technology.
Color Doppler, Sonography machine	Siemens Sonoline G-50(Radiology-Rm 1) , SEIMENS ACUSON SEQUIA 512, S.NO-66564(Radiology-Rm 2) Sonosite (wellness) Siemens Acuson Sequa 512, S.No.-66574 (Cardiac Opd) Wipro GE Logic100 (Obs/Gyneac Opd) Philips HD 7 XE Colour Doppler System (IVF) Siemens Acuson Cypress CV (ICU)
Departmental X-Ray	SiemensPolyLX Multix Siemens PolyLX KLH (Fluro)
Portable X-Ray	Siemens MM 10 Siemens MM 2.5 Siemens MP 10+ (Wellness)
C-Arm X-Ray Image Intensifier	Siemens Arcadis (Operation Theatre) Siemens MM 5 E (Operation Theatre) Siemens MM5 C (Lithotripsy – Urology Department)
Computerized Radiography	Kodak Direct View CR975 System
Bone Mineral Density	
Lazer camera	Kodak dry view Lazer images
PACS	SOMATOM SRIT
DEXA SCAN	Model- LUNAR prodigy, GE make
Mammography	Siemens Mammomat 3000 Nova

Staffing Pattern of Radiology Dept.

X-Ray, BMD and Mammography Staff:

- Technicians - 6
- Receptionist – 1
- Housekeeping - 3

Duty Roaster:

- Morning – 7.30am to 3.30pm - 1 technician, 1 housekeeping
- General – 9.30am to 5.30pm – 1 technician, Receptionist
- Afternoon- 3pm to 10pm – 1 technician, 1 housekeeping
- Night- 10pm to 7.30am- 1 technician, 1 housekeeping
- Off- 1 technician
- Sunday- off for Receptionist

USG Staff:

- Sisters- 2

Duty Roaster:

- Morning- 9am to 5.30pm- 1 Sister
- Afternoon- 12.30pm to 8pm- 1 Sister

CT and MRI Staff:

- Technician – 5
- Sister- 1
- Housekeeping – 3
- Receptionist- 1

Duty Roaster:

- Morning- 7.30am to 3.30pm - 1 technician, 1 housekeeping
- General- 12 pm to 8.30pm – 1 technician
- Evening- 3pm to 10pm – 1 technician, 1 housekeeping
- Night- 10pm to 7.30am – 1 technician, 1 housekeeping
- Off- 1 technician
- Sunday- off for Receptionist

Radiologist: 5 in numbers.

Duty Roaster:

- Morning: 8am to 2pm

- General: 10am to 5pm
- Evening: 2pm to 8pm
- Night: 8pm to 8am

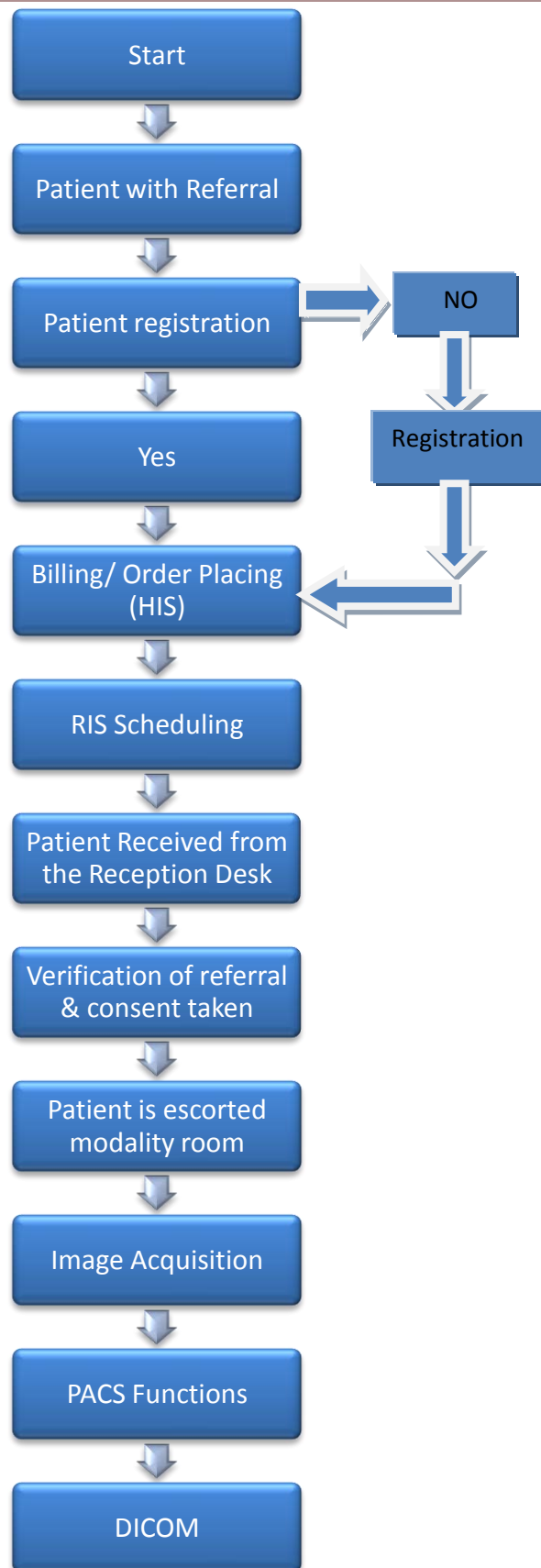
RADIOLOGY DEPARTMENTAL PROCEDURE

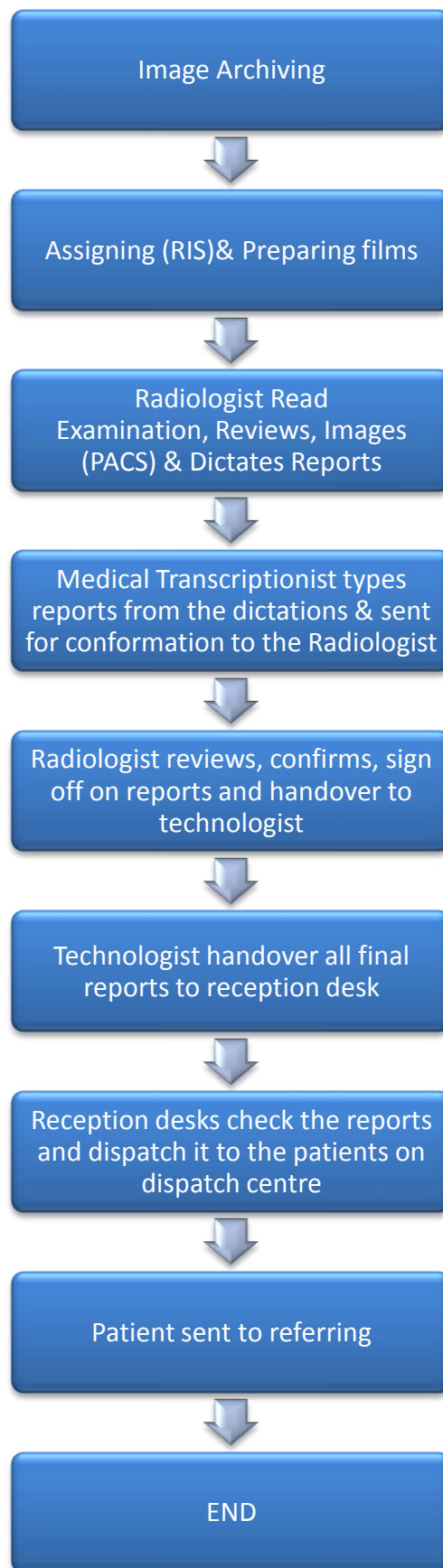
- The individual will be first attended by the reception desk.
- Registration , payment is done at the reception
- Individual will be guided to the radiology lounge
- The X-RAY technician will write the details in the register.
- For USG/CT the patient will be asked to drink water/ oral contrast, as required.
- Obstetric patient will fill out the PNDT form declaring, “no sex determination”
- CT patient will be given oral contrast and explained the procedure.
- The wait time for each individual test will be explained.
- Patient with appointment will be taken according to their allotted slot.
- Emergency patient will take preference over all patients.
- Walk in patient will be explained the waiting period. If not acceptable, they will be scheduled for an appointment.
- Fasting & indoor patients will be done early morning; other will be scheduled for mid afternoon.
- The hard copy will be assessed by the radiologist; the report will be kept for typing.
- The receptionist will confirm the mode of delivery of reports once again and thanks the patient.

REPORTING AND TYPING OF THE REPORTS:

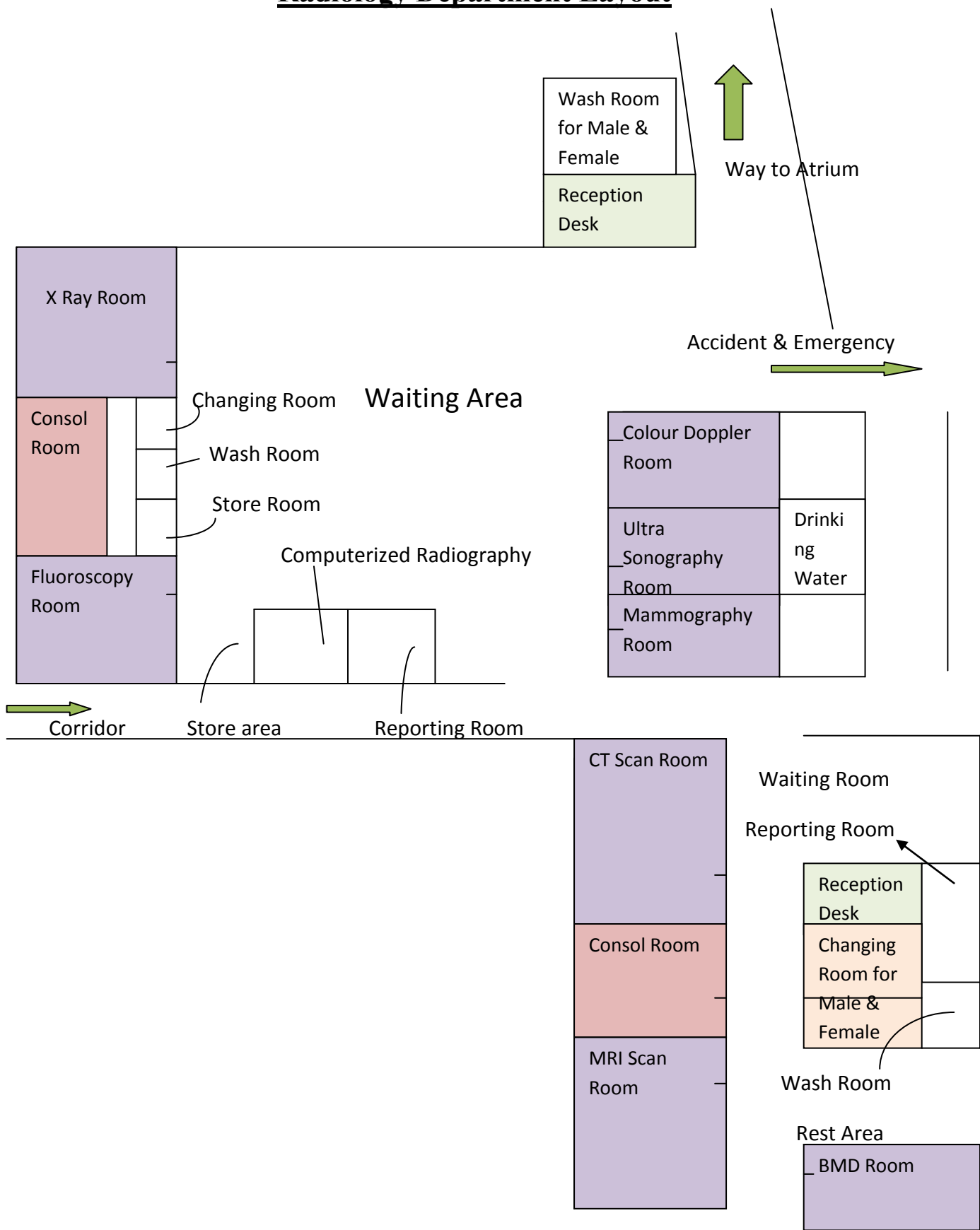
- For the purpose of typing of reports, they have Dictaphone recording for CT and MRI reports , where the doctors record while reporting the scans and the recorded file is uploaded on a software used by the typist .The typists then receive the form filled by the patient at the registration counter with their details. On uploading of the recorded file, the typists select the report consecutive with the name of the patient on the forms that they have. They then listen to the recording and make changes on the preformatted normal report.
- For USG, the typist take the dictation while the scan is going on as the reporting is done simultaneously, and then type the report in between the scans.
- For x ray, the typists go for verbal dictation to the radiologists and the type the reports.

Flow Chart for Radiological Procedure(X Ray/USG/Colour Doppler/Biopsy/CT/MRI)





Radiology Department Layout



STUDY ON RADIOLOGY DEPARTMENT EQUIPMENTS UTILIZATION

RESEARCH QUESTION

Is the Capacity Utilization of Equipments (X-Ray Machine, Ultra Sonography Machine, CT and MRI) in Radiology Department of ABMH satisfactory and to find out gaps if underutilized?

Introduction

Utilization essentially means the use of the equipment to its full potential. Clear vision and thought regarding the use of the equipment are necessary so that realistic performance may be set. It should be the endeavour of the management to optimize the equipment utilization to obtain maximum return for the capital invested. Proper utilization of the hospital equipment will lead to:

- Optimal patient handling and rapid turnover
- Minimum possible cost
- Quality patient care and satisfaction

It can be calculate by using coefficient to assess its utility by applying the simple formula $UC = N/M \times 100$, where N is number of hours an equipment is likely to be used in a day and M is maximum number of hours the equipment could possibly be used in a day. If the use coefficient is less than 50 percent, it is considered to be underutilized, and hence shows a bad investment. However, life saving equipment cannot be subjected to this kind of assessment. (1)

A capacity utilization rate, for any entity, is the amount of output it has compared to the potential output it should be producing. This, stated in simpler terms, simply is the difference between what a company is producing and what it is capable of producing at any given time. (2)

Equipment Utilisation Rate Formula

Radiology equipment utilization can be calculated from below mentioned formula:

Equipment utilization rate =

$$\frac{\text{Total no. of hours the equipment is used}}{\text{Total no. of hours the equipment can be used}} \times 100$$

Objectives

- To determine the Capacity Utilization Rate of Radiology Department Equipments
- To provide recommendations to improve Capacity Utilization if required.

Need For Study

Hospital can benefit from capacity utilization rate data because it will be able to tell that what types of services are most needed and what, perhaps, is a waste of the hospital's resources. Economic stability is often determined by the capacity utilization rate of any given entity. If a hospital determines it is running either too low or too high it can adjust the operations accordingly to allow for a profit to be made. This will allow a hospital to streamline its offerings to meet the public needs. A hospital having over utilization in one department and way under in another may adjust this to fulfil the demands of the area it serves.

Equipments Taken for Study

Equipment	Make /Model
CT scan	Siemens, MDCT system cardiac Somatom sensation 64 slice.
MRI	Siemens, magneto Avento 1.5 tesla with TM technology.
Color Doppler, Sonography machine	SEIMENS ACUSON SEQUIA 512
Departmental X-Ray	SiemensPolyLX Multix Siemens PolyLX KLH (Fluro)

Review Literature

Equipment plays major role in hospital and health care services as an aid to health professionals, providing efficient diagnostic and therapeutic tools to make the identification of the disease problem and their cures accurately and appropriately.

Radiology uses medical imaging technology to diagnose and treat medical conditions. Radiology has been used for medical purposes for over a century and remains a cornerstone of the medical field. Electromagnetic energy produces visible images that are then read and interpreted by radiologists. Physicians use the information gained through radiological imaging to diagnose, treat and monitor injuries and diseases. Cancer and other medical conditions are also treated with radiological technology through the use of concentrated radiation doses (3)

Radiology Department is the most important department of the hospital. It is said to be the primary source of revenue generation with around 50-60 per cent of revenue earned just by this area. The equipments present here are having high cost. It requires maximum utilisation and appropriate management of these medical equipments to ensure optimum cost-benefit.

Effective management and efficient maintenance of the equipments in radiology department has deep economical impact on the hospital and is vital for smooth functioning.

Capacity utilization depends on market demand and on scheduling production for the most efficient use of facilities. A structured approach to capacity planning lets use capacity utilization rates to determine when need to expand capacity to satisfy increasing demand for products.

Low Utilization

If production capacity is idle, investment in the facilities and equipment is not generating any income and reducing potential profit. Since additional production volume does not increase fixed costs, higher capacity utilization may result in lower per-unit product costs and higher potential profits.

For example, if facilities have a capacity of 1,000 units per month and cost \$10,000 per month to operate, producing 500 units with a variable cost of \$20 costs $500 \times \$20$ plus \$10,000 for a total of \$20,000, or a unit cost of \$40. If it produces 800 units, costs are $\$20 \times 800$ plus \$10,000 for a total of \$26,000, or \$32.50 per unit. If it sells 800 units at a reduced price of \$35, overall profit increases.

Peaks

Unless planning compensates, peaks in capacity utilization can damage both product quality and profitability. When it sees a demand peak approaching through an increase in orders for product, it has to delay deliveries so that it can smooth the effect on production schedule. Peaks that surpass the normal maximum capacity lead to problems in production

that affect product quality and overtime that reduces profits. Managing demand through price adjustments to reduce demand during peaks and increase demand during troughs balances schedule and achieves maximum profitability.

Full Utilization

When product is successful, it can reach full capacity utilization, leading to high profitability and a streamlined manufacturing plant that turns out high-quality products. If want to company grow, and if planning has correctly forecast the trend toward the use of all capacity, it can now expect to have new capacity coming online to take over new demand. Profitability will drop as your total capacity utilization decreases temporarily, but increasing demand will bring profits back up to a higher level as approaches to full utilization of the new capacity.

Over-Utilization

When capacity utilization passes it's maximum due to demand that exceeds ability to supply the products, costs rise and product quality decreases. To meet excess demand, have to schedule overtime those results in higher costs and stressed workers who make more mistakes. There is less time for equipment maintenance, and employees cut corners to maintain high levels of production. It has to avoid over-utilization of capacity by acting to reduce demand with longer delivery times and higher prices. (4)

Brief look at the different types of medical equipment:

Diagnostic: This equipment is used for making diagnoses of specific problems and includes devices such as MRIs and ultrasounds. A variety of medical supplies are associated with this type of equipment, like petroleum jelly and electrode pads.

Monitoring: Used for continually monitoring different signals from the body or a machine, this category includes things like heart and blood pressure monitors. Some devices, such as those for monitoring blood pressure, are classified as supplies themselves, while other pieces of equipment are self-contained, requiring no supplies at all.

Laboratory: Laboratories use an entire classification of equipment that is used on the back end to perform research or make detailed analysis. Typically the supplies required are laboratory specific and not classified under medical supplies.

Therapeutic: Devices and equipment that help in rehabilitation and therapy (pain relief, range of movement, mobility, etc.).

Life Support: These devices are used to for keeping biological systems alive. (5)

Research Methodology

Study Area:

Radiology Department, ABMH, Pune

Study Type:

Descriptive Case Study

Study Population and Size

Study Population:

Procedures performed in radiology department for 8:00 AM to 8:00 PM over period of one month i.e. 30 days from 7 April 2014 to 6 May 2014 including OPD, IPD, and A & E patients (with appointment and walk in patients)

Sampling Method:

Non Probability Sampling Method (Convenient)

Sample Size:

For X-Ray Machine (Siemens Poly LX Multix): 811

For Fluoroscopy Machine (Siemens PolyLX KLH): 37

For USG Machine (SEIMENS ACUSON SEQUIA 512): 896

For CT (Siemens, MDCT system cardiac Somatom sensation 64 slice): 284

For MRI (Siemens, magneto Avento 1.5 tesla with TM technology): 172

Data Collection

Data Collection Tool:

MS Excel Sheet was prepared to note down observation

Data Collection Technique:

Primary Data:

Peer Observation

Interaction with Staff

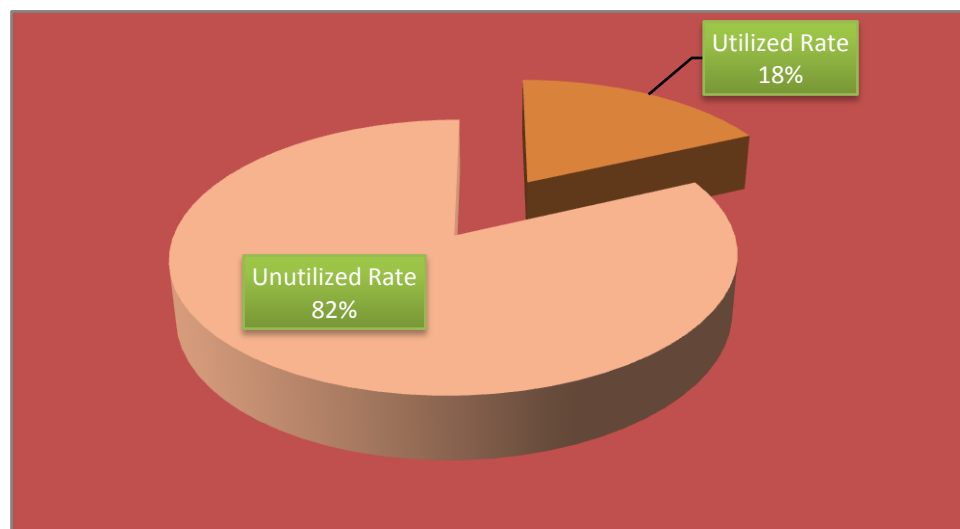
Secondary Data:

Radiology Department Records

Analysis and Interpretation

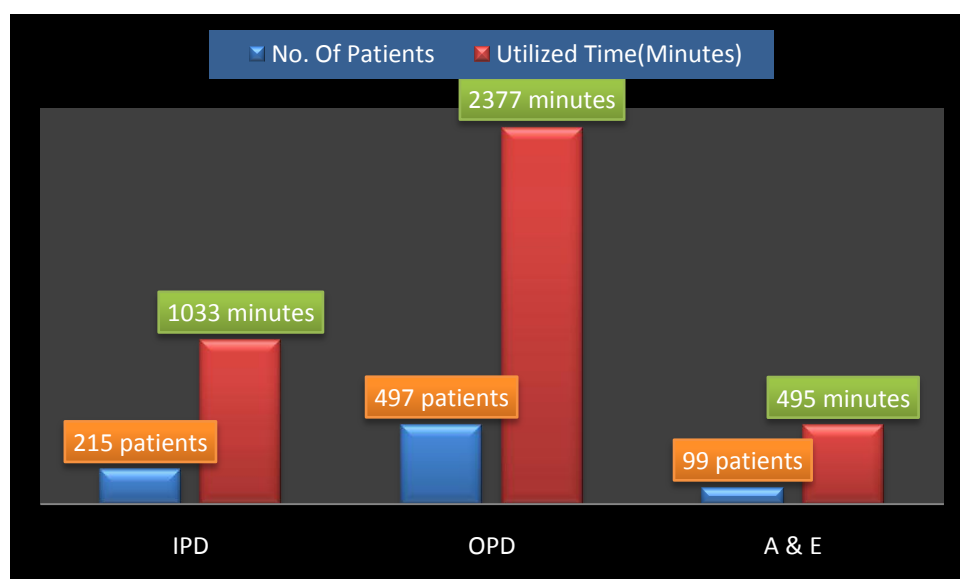
1. Siemens Poly LX Multix-

Out of the survey conducted 811 patients in operational time i.e. from 8am to 8pm had gone through this machine for investigation. It is observed that utilization rate of Siemens Poly LX Multix machine is 18%. Utilization rate is less because there are separate X-Ray machines for wellness dept., ICU and for A & E. So patients are distributed accordingly. Average utilization time taken by X-Ray (Siemens Poly LX Multix) is 4.81 minutes



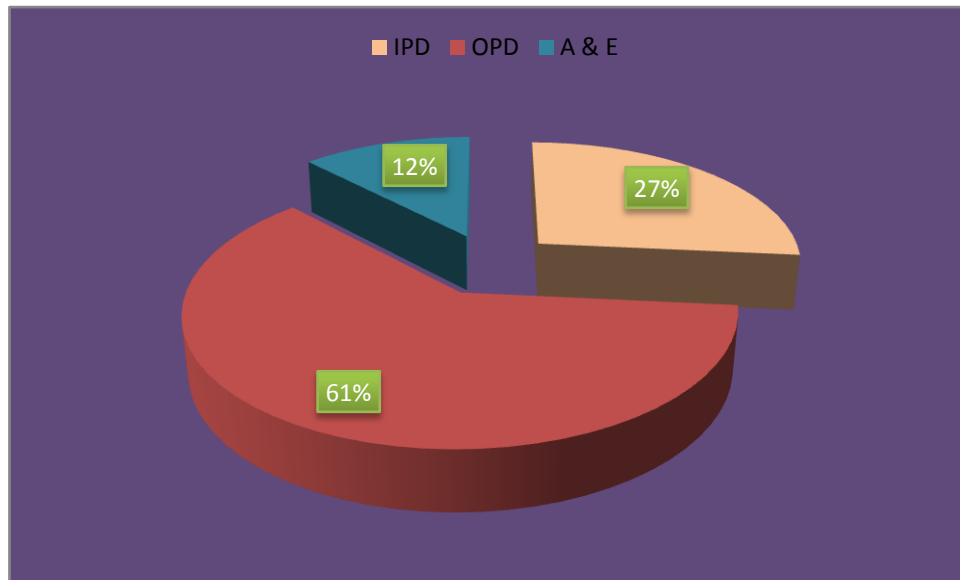
Utilization rate of Simens Poly LX Multix in Operational time

There were 215 IPD patients utilized 1033 minutes, 497 OPD patients utilized 2377 minutes and 99 patients from A& E utilized 495 minutes of Siemens Poly LX Multix machine (X-ray Machine)



Utilization Time of Siemens Poly LX Multix According to Wards

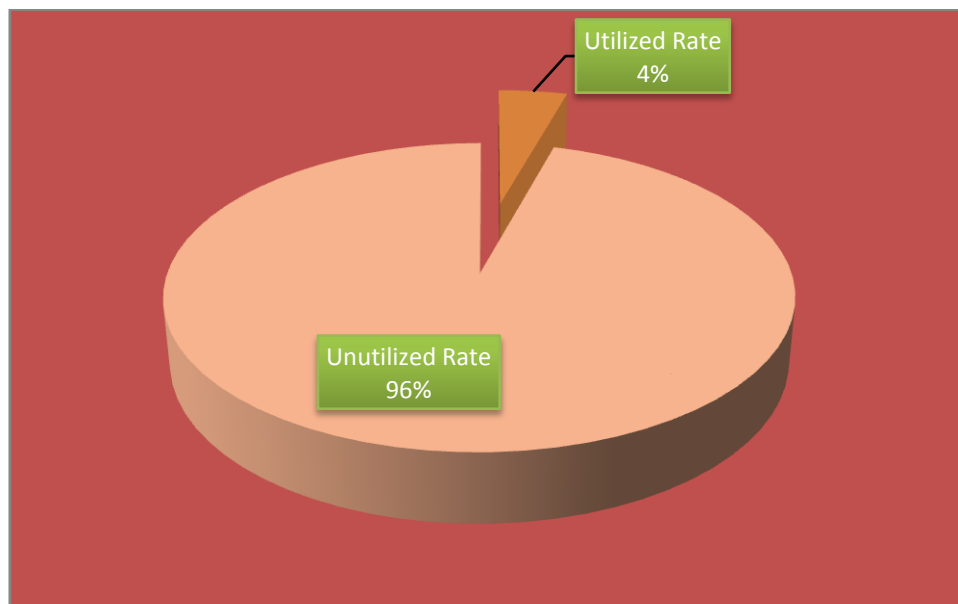
Out of total utilization rate i.e.18%, IPD patient has utilized 27%, OPD patients utilized 61% and 12% utilized by A & E patients.



Distribution of Percentage of Utilization Rate of Siemens Poly LX Multix According to Wards

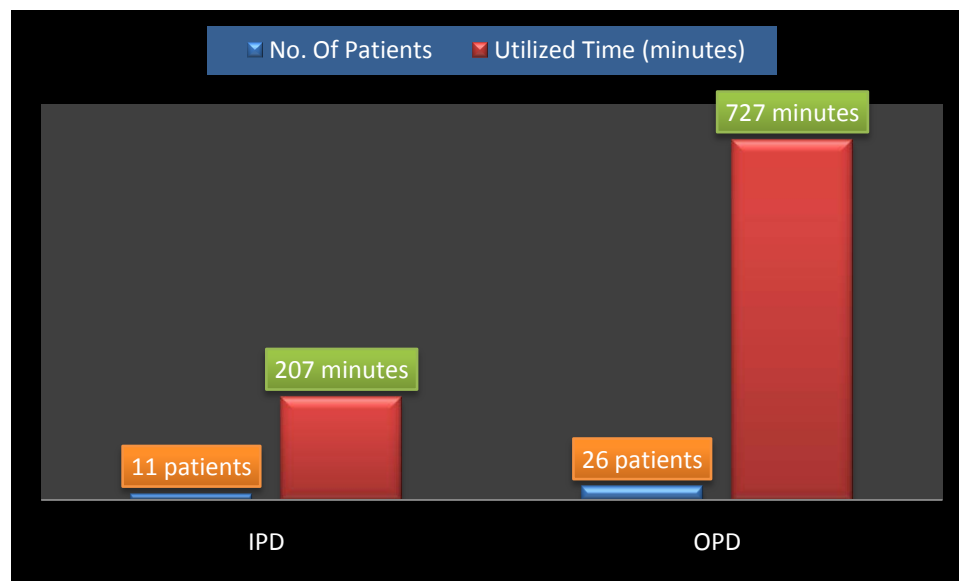
2. Siemens Poly LX Multix

Out of study conducted 37 patients had used this machine for procedure in operational time. The utilization rate of Siemens PolyLX KLH is 4%. Average utilization time taken by fluoroscopy machine (Siemens Poly LX Multix) is 25.24 minutes.



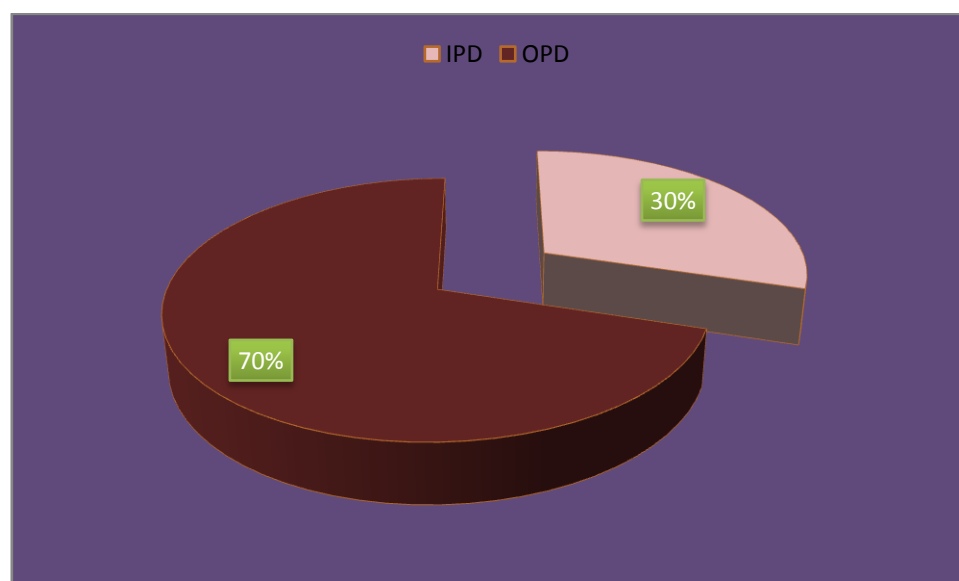
Utilization Rate of Siemens PolyLX KLH

Following graph gives idea that 11 patients were from IPD had used this machine for 207 minutes and 26 patients were from OPD had this machine for 727 minutes.



Utilization Time of Siemens PolyLX KLH of According to Wards

This graph shows distribution of 4%utilization rate. IPD patients utilized 30% and OPD patients utilized 70%.



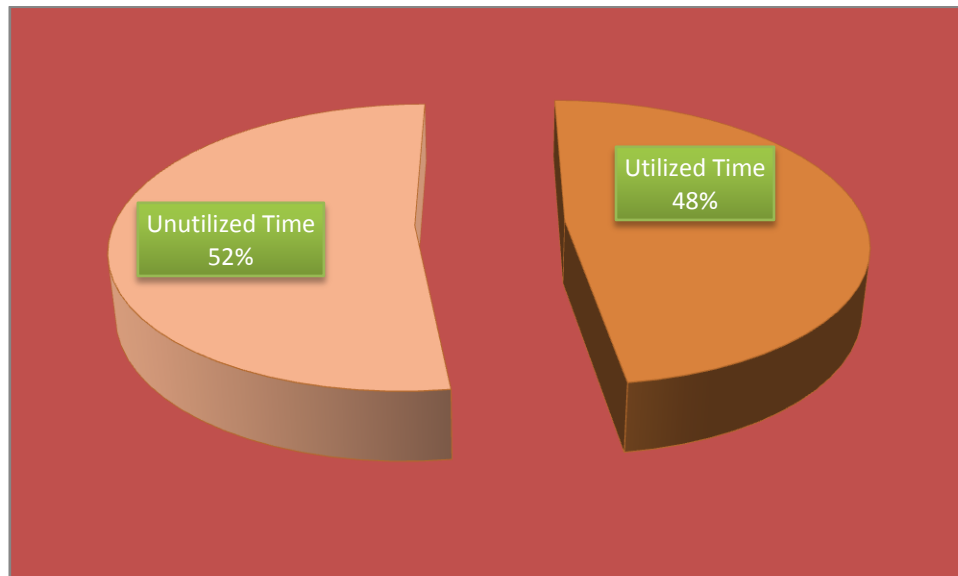
Utilization Rate of Siemens PolyLX KLH of According to Wards

3. SEIMENS ACUSON SEQUIA 512

Out of study conducted total number of patients 896 had gone through various procedure of ultra sonography in operational time. The utilization rate of SEIMENS ACUSON SEQUIA 512 machine is 48%.

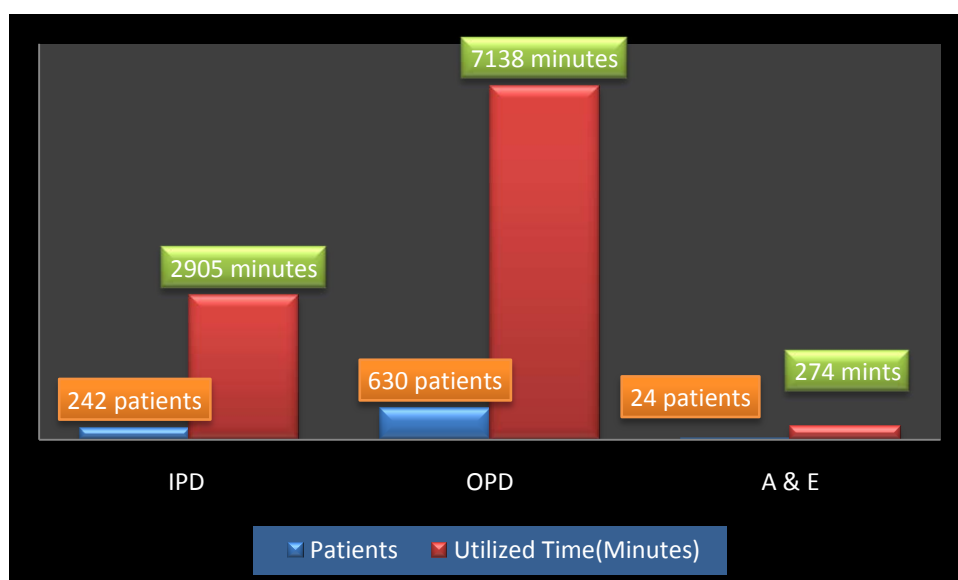
Utilization rate is less because there are separate USG machines for wellness dept. and ICU. So patients are distributed accordingly. Thus utilization rate had come down.

Average utilization time taken by ultra sonography machine (SEIMENS ACUSON SEQUIA 512) is 11.51minutes.



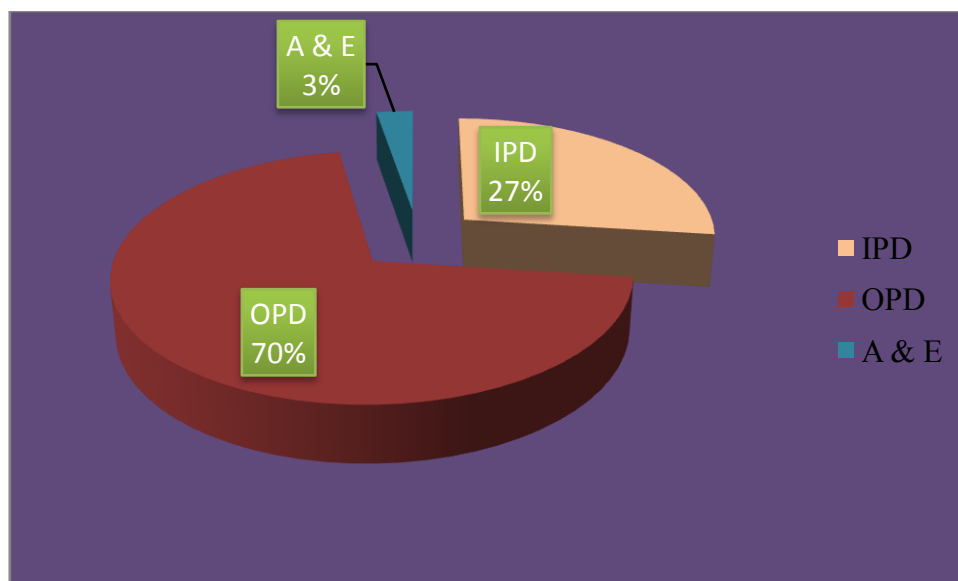
Utilization Rate of SEIMENS ACUSON SEQUIA 512

There were 896 total patients out of that 242 IPD patients used this machine for 2905 minutes, OPD patients used for 7138 minutes and A& E patients used for 274 minutes



Utilization Time of SEIMENS ACUSON SEQUIA 512 According to Wards

Distribution of 48% utilization rate is as IPD patients had utilized 27%, OPD patients utilized 70% and A & E utilized 3%.

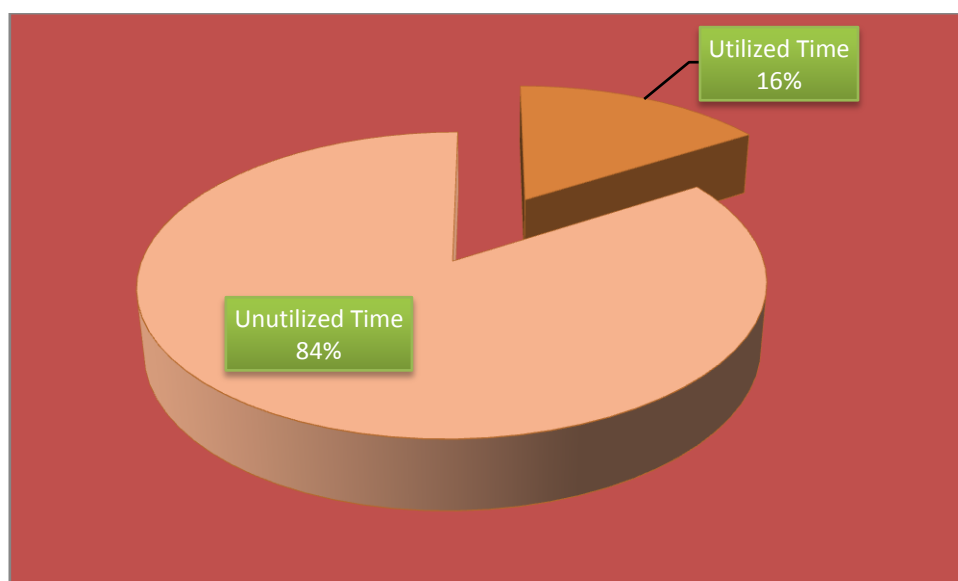


Distribution of Utilization Rate of SEIMENS ACUSON SEQUIA 512 According to Wards

4. Siemens, MDCT system cardiac Somatom sensation 64 slice

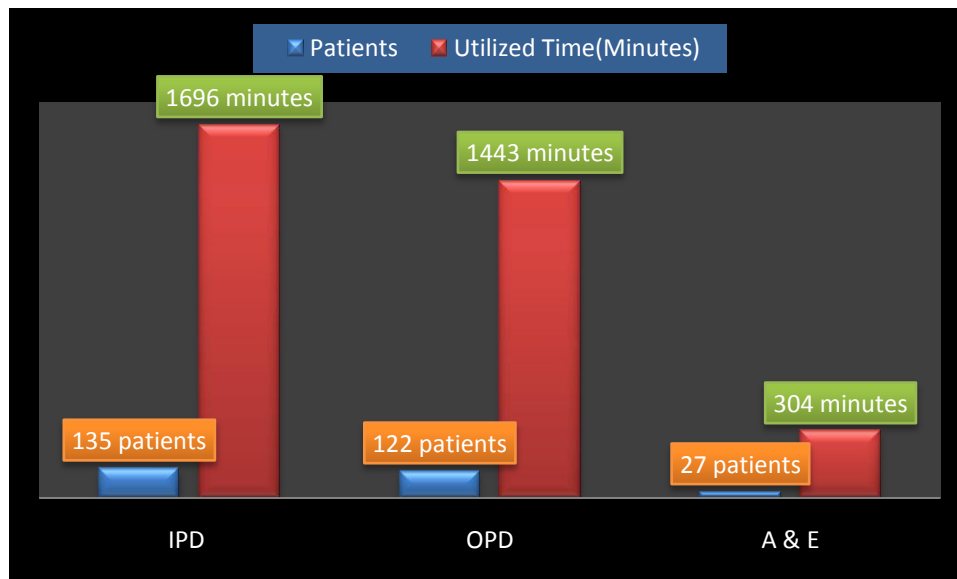
Out of study conducted total number of patients 284 had gone through various procedure of CT scan in operational time. The utilization rate of Siemens, MDCT system cardiac Somatom sensation 64 slice machine is 16%.

Average utilization time taken by CT scan machine (Siemens, MDCT system cardiac Somatom sensation 64 slice) is 12.12 minutes.



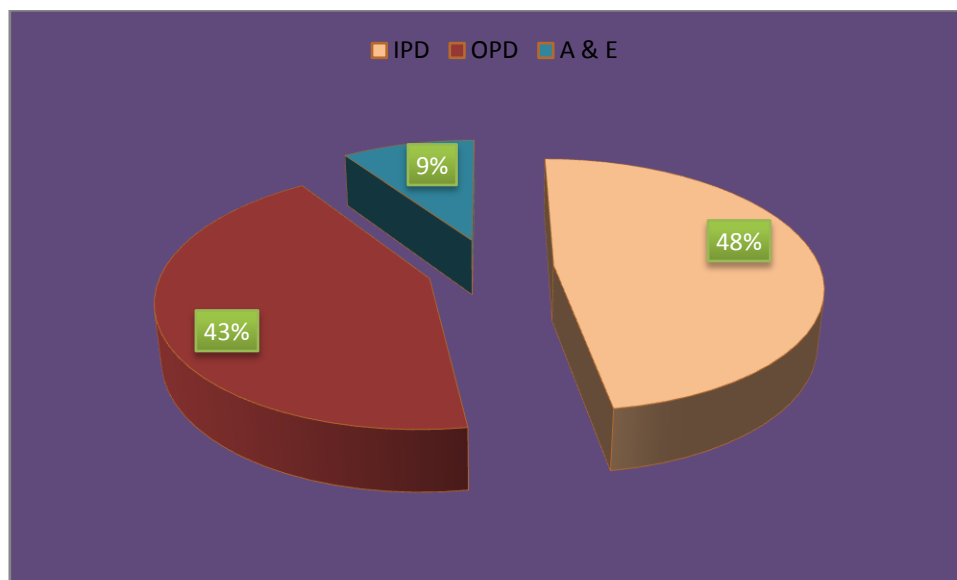
Utilization Rate of Siemens, MDCT system cardiac Somatom sensation 64 slice

Out of total patients during study 135 IPD patients utilized machine for 1696 minutes, 122 OPD patients utilized machine for 1443 minutes and 27 A & E patients for 304 minutes.



Utilization of Time of Siemens, MDCT system cardiac Somatom sensation 64 slice according to Wards

Distribution of 16% utilization rate is 48% by IPD patients, 43% by OPD patients and 9% by A&E patients.

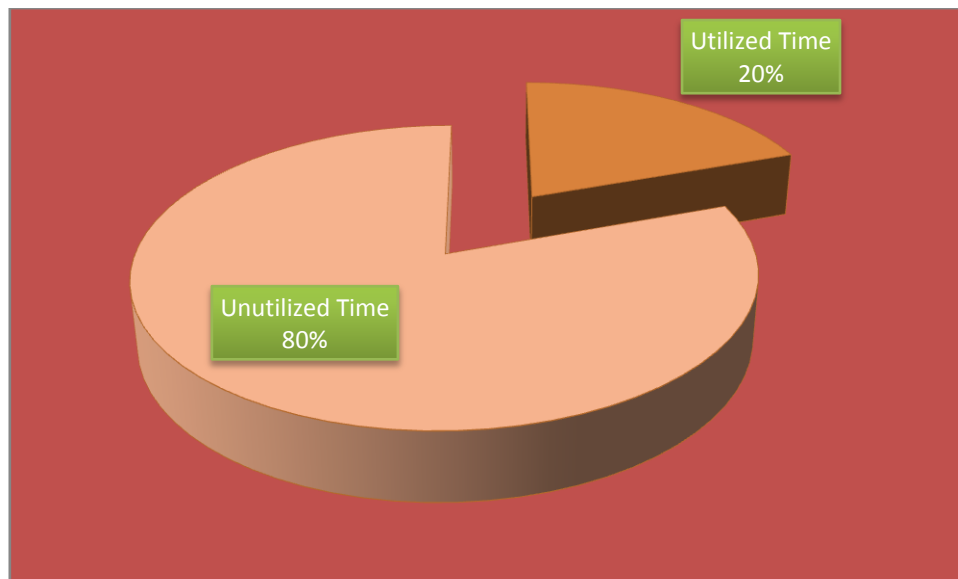


Utilization of Rate of Siemens, MDCT system cardiac Somatom sensation 64 slice according to Wards

5. Siemens, magneto Avento 1.5 tesla with TM technology

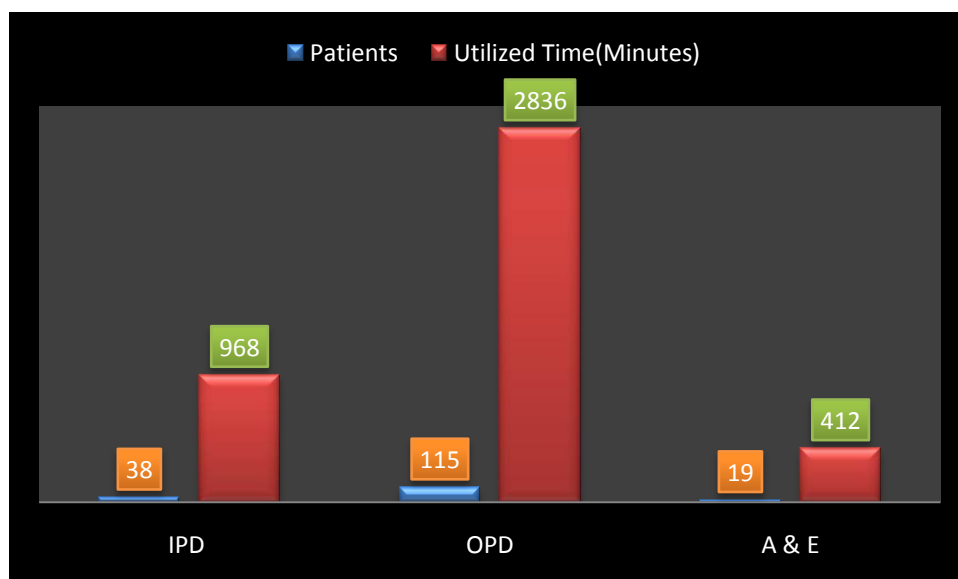
Out of study conducted total number of patients 172 had gone through various procedure of MRI scan in operational time. The utilization rate of Siemens, magneto Avento 1.5 tesla with TM technology machine is 20%.

Average utilization time taken by MRI scan machine (Siemens, magneto Avento 1.5 tesla with TM technology) is 21.51 minutes.



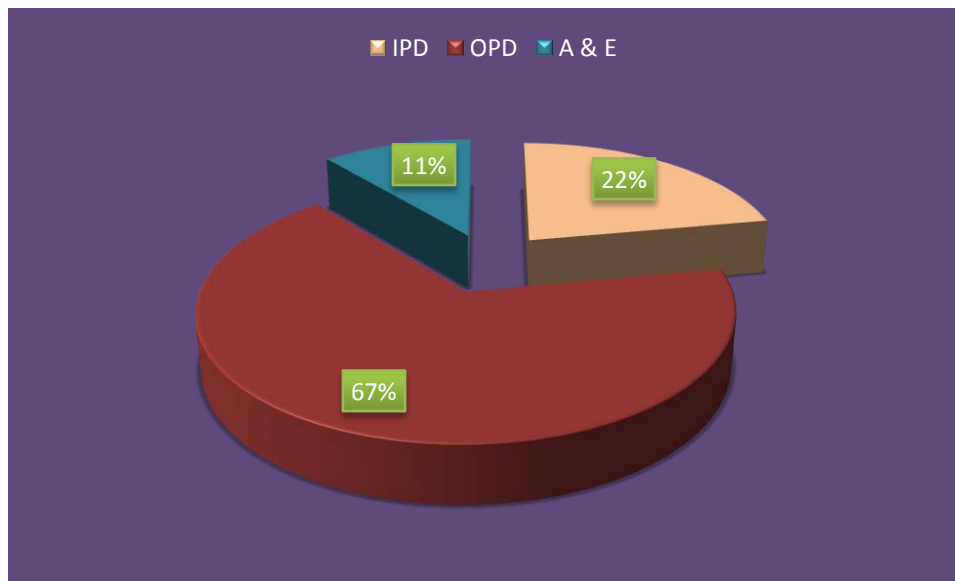
Utilization Rate of Siemens, magneto Avento 1.5 tesla with TM technology

Out of total patients during study 38 IPD patients utilized machine for 968 minutes, 115 OPD patients utilized machine for 2836 minutes and 19 A & E patients for 412 minutes.



Utilization Time of Siemens, magneto Avento 1.5 tesla with TM technology according to Wards

Distribution of 20 % utilization rate is 22% by IPD patients, 67% by OPD patients and 11% by A&E patients.



Distribution of Utilization Rate of Siemens, magneto Avento 1.5 tesla with TM technology according to Wards

Observation

- As per study findings, Utilization rate of equipments taken for study are below 50%. This indicates that all equipments are underutilized.
- Utilization rate of equipments are mentioned below

Equipment Name	Utilization Rate
Siemens Poly LX Multix	18%
Siemens PolyLX KLH	4%
SEIMENS ACUSON SEQUIA 512	48%
Siemens, MDCT system cardiac Somatom sensation 64 slice	16%
Siemens, magneto Avento 1.5 tesla with TM technology	20%

- Utilization rate of USG machine is higher as compared to other equipments in radiology department.
- In study, it was found that 16 patients of CT scan and 11 patients of MRI scan had gone back because of high cost.
- For average time of utilization is 5 minutes where 2 minutes are required for actual procedure and 3 minutes are required to check image quality.
- Delay of transportation of IPD patients to radiology department thus it turn to wastage of time, which leads to underutilization.
- Billing takes approximately 15 minutes for most of the patients in radiology departments so it affects further procedure of radiology depart.

Recommendation

As study equipments are underutilized, due to less flow of patients. Therefore, attempts can be made to increase flow of patients.

- Marketing of radiological facilities available at ABMH can be done through media like television, newspaper, radio, hoardings etc.
- There can be strong referral system for radiological investigation. To develop this referral system, Memorandum of Understanding (MOU) can be signed with orthopaedic, neurologic, physician and small scale hospitals or they can be assigned as authorized reference centre of ABMH.
- There can be package system for radiology investigation, where some patients need to be done more than one procedure.
- There can be happy hours or a day. So those patients come in happy hours or a day can get discount on the cost.
- A committee can be formed which shall include senior employees like radiologist, radiology technician, biomedical engineer, marketing personnel and radiology manager. There should be meeting of these committee members at regular interval to assess functioning of radiology and equipment utilization. Radiology manager should be responsible to conduct this meeting. Radiology manager should maintain data of radiology equipments utilization.
- Needs to do analysis of cost of investigation or scan.
- To increase patient flow and to stay in competition, Newer and modern technologies are needed in radiology department to reduce the procedure time. Now at present computed radiography system is available. Instead of that direct radiography system can be used to reduce procedure time. Same can be done in fluoroscopy machine, can add video mode software which helps to do continuous procedures, thus it reduces procedure time.
- There can be proper co-ordination between transport department and radiology department.

Reference

- 1 http://www.medicalbuyer.co.in/index.php?option=com_content&task=view&id=1095
- 2 <http://www.howtodothings.com/health-fitness/how-to-determine-the-capacity-utilization-rate-for-a-hospital>
- 3 <http://www.imaging.com>
- 4 <http://smallbusiness.chron.com/capacity-utilization-effects-product-profit-67046.html>
- 5 <http://medicalsupplies.net/types-of-medical-equipment/>
- 6 <http://www.businessdictionary.co.in/defination-of-utilization>
- 7 <http://www.businessdictionary.co.in/defination-of-capacity-utilization>

STUDY ON DISPATCH OF REPORTS IN RADIOLOGY DEPARTMENT

Research Question

Is there delay in process of dispatching reports from radiology department of ABMH, Pune to the patients and to find out the reasons for delay?

Introduction

In radiology department after every procedure radiologist are interpreting images which are produced by electromagnetic energy and radiation. For every imaging radiologist has to give written report to patient, which will further used by physician to diagnose, treat and monitor diseases.

This report should be hand over to the patients with in appropriate time. It will help the patients to get medicine and treatment in emergency and within required time. Thus in ABMH, Pune, they have set a standard protocol to deliver a report to patient within 2hrs after procedure in radiology department.

It is helpful to hospital to maintain quality of radiology department and ensure to get treatment for patients within required time.

Objectives

- To determine process flow of dispatching reports.
- To evaluate reasons for delay in dispatching radiology reports to patients.
- To recommend for smooth functioning of dispatching radiology reports.

Rationale

Physicians use the information gained through radiological imaging to diagnose, treat and monitor injuries and diseases. Cancer and other medical conditions are also treated with radiological technology through the use of concentrated radiation doses and for that radiology reports are essential within required time.

Radiology reports are one of part of quality care and to maintain quality care of radiology department. Reports should be dispatched according to standard protocol.

Patients are increasingly demanding, and understandably so, that since they pay for their medical tests, they should receive results directly and immediately. Patient comments insisting that physician reporting and interpretation is too often unreasonably delayed.

Process Flow of Report dispatch

- Radiologist Read Examination, Reviews, Images (PACS) & Dictates Reports
- Medical Transcriptionist types reports from the dictations & sent for conformation to the Radiologist.
- Radiologist reviews, confirms, sign off on reports and handover to technologist.
- Technologist handover all final reports to reception desk.
- Reception desks check the reports and dispatch it to the patients.
- Patient sent to respective physician.
- All this procedure should be complete within 2hrs after completing of radiological procedure.
- If patients wish to take report next day of procedure, he/she has to collect report from dispatch centre and it is situated near blood sample collection room.
- Dispatching process is done thrice a day for IPD as well as for OPD i.e. at 8 AM, 4 PM and 10 PM.

Flow Chart of Report Dispatch



Review Literature

The pilot study, published in the April 2 issue of the Journal of the American College of Radiology, showed that about half the participants preferred immediate access and about a third preferred access within three days, even in the face of very serious findings written in complex medical language and the knowledge that their doctor might not be available to discuss the results with them right away.

"Our study showed that even though the participants didn't completely understand the medical terminology, they wanted to be able to read the detailed report as soon as possible," said Annette Johnson, M.D., associate professor of radiology at Wake Forest Baptist and principal investigator of the study.

"One of the primary tenets in the drive to improve the quality of medical care is that services need to be delivered in ways that directly meet patients' needs and preferences," she said. "While current medical practice requires that radiologic test results go to the patient indirectly, usually verbally via the referring physician, this practice can potentially create delays, increase patient anxiety and compromise communications between patients and doctors."

An emerging trend in health care is establishing secure online systems that allow patients to access electronic health records. Multiple studies suggest that patients increasingly want to obtain information directly and be involved in making medical decisions. And research shows that this type of increased patient engagement has been associated with improved health outcomes and patient well-being.

In the Wake Forest Baptist study, 53 adult outpatients from the hospital's imaging center completed researcher-administered electronic questionnaires. Participants were presented with three simulated clinical scenarios and asked to answer questions based on what they thought they would do in each case.

The three scenarios were: a patient suffering from headaches whose head CT showed a normal-appearing brain but some sinusitis; a patient experiencing double vision whose brain MRI showed multiple brain lesions from an unknown cause, possibly multiple sclerosis or vasculitis; and the patient with back pain and right leg weakness whose MRI showed cancer compressing spinal nerves. In addition, the participants were asked about their preferred timing for online access to reports, communication methods, educational resources and alternative formats.

Eighty-one percent of the participants said they likely would use an online portal to access radiologic test results if such a system were available. Forty-three percent said they preferred the online portal over any other method of notification, including a phone call from a nurse or a physician, a mailed letter explaining the results, an email explaining the results or a return visit with their doctor.

For each of the three scenarios, immediate access was the most preferred option, and more than 80 percent of the participants wanted online access within three days. Preferences for timing did not vary significantly across the three scenarios or by participant's age or gender, according to the study findings. (1)

Radiology reports are medical acts, performed by medically qualified personnel, namely radiologists. Radiology reports reflect opinions expressed by radiologists based on the findings of medical images, clinical history provided, previous imaging review, and laboratory results that are made available. They also can include recommendations about further management of the patient when this is appropriate, including further investigations or referral to another specialty.

Patients often do not understand the role of the doctor behind the interpretation of images by scan providers. Their clinical contact is usually limited to radiographers. Radiographers should be required to inform the patient about the qualifications of the radiologist reporting their images, where they are based, and whether they are employed by the provider organization or a member of a contracted teleradiology service provider. They also should be advised as part of the consent process as to how to submit a complaint.

While it is unlikely that patients will see the radiology reports prepared for them, their physicians will. An accurate diagnosis conveyed in a report meeting high-quality standards should always be the output of the interpreting radiologists.

With medicine becoming hugely complex, sub specialization has become inevitable for maintaining quality. However, the downside of sub specialization is clinical care fragmentation, which could lead to poor patient management.

It is well-recognized that face-to-face communication is the best form of communication, but this can be supplemented by audio, video, and written communication, including electronic communication. However, radiologists must be accessible to the ordering physician of an exam, the patient's medical team, and even the patient himself. Surveys are an excellent method of determining how satisfied the ultimate users of a radiology report are with regard to this.

Similarly, a radiology department should conduct periodic audits of the quality of radiology reports. This should be done through self-auditing, peer review, and surveys of referring physicians. Questions that should be asked of ordering physicians include if the report can be read and understood in isolation of the images, the language and terms used are understandable, it answers the clinical question, the radiologist was easy to contact, and an abnormality was identified if enough appropriate information was provided. (2)

Research Methodology

Study Area

Radiology Department, ABMH, Pune.

Study Type:

Non Intervention Prospective Study and Descriptive Case Study

Study Population and Size

Study Population:

Procedures performed in radiology department over period of 10 days from 15 April 2014 to 24 May 2014 including OPD, IPD.

Sampling Method:

Non Probability

Sample Size:

X-Ray Reports: 505

CT Scan Reports: 107

MRI Scan Reports: 76

Data Collection

Data Collection Tool:

MS Excel Sheet was prepared to note down observation

Data Collection Technique:

Primary Data:

Observation

Interaction with Staff

Secondary Data:

Radiology Department Records

Exclusion

- USG dispatched reports were not included in this study as it was difficult to collect data from all modalities at a time and also there was no proper co operation from USG staff.
- For BMD and Mammography maximum 3 to 4 patients per day were going through these procedures, so there was no problem in dispatching reports in required time.

Analysis and Interpretation

1. Number of delayed reports:

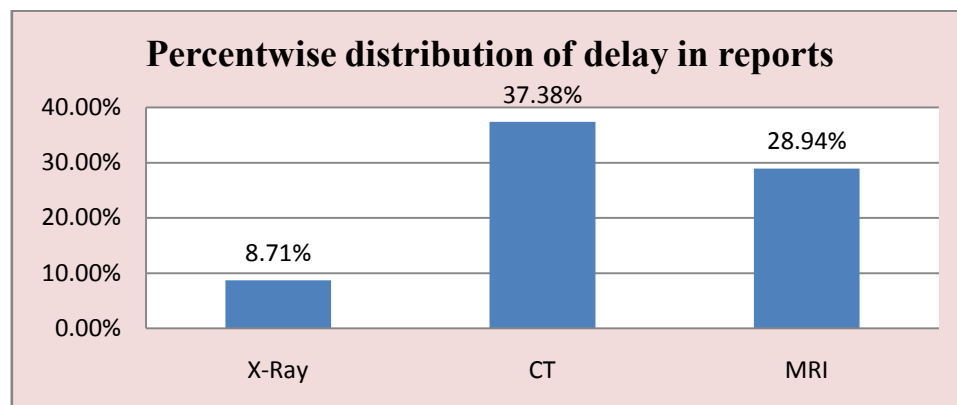
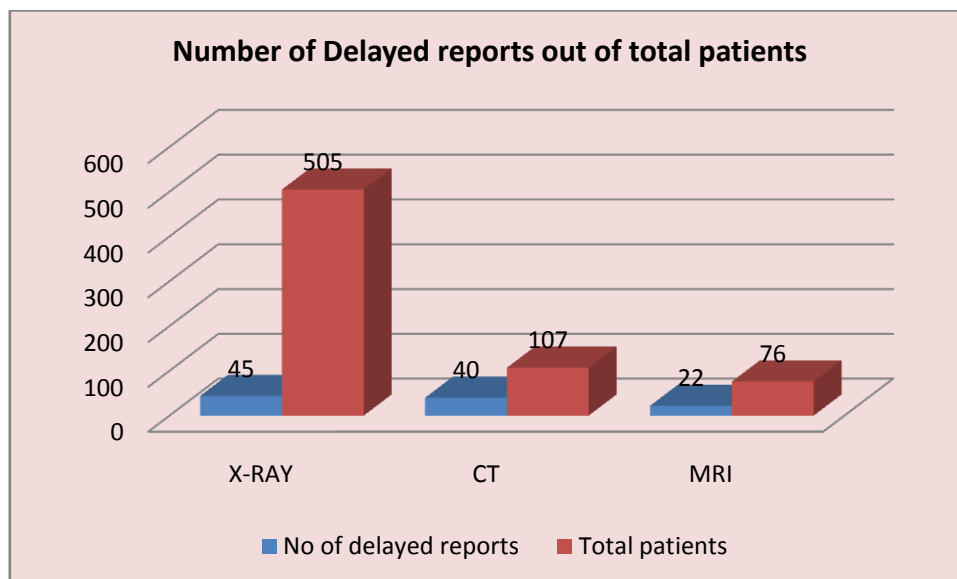
Below graph depicts the number of delayed reports of X-Ray, CT, and MRI diagnostic department.

In case of:

A) X-Ray: Out of 505 (100%) patients in x-ray department, there was delay in dispatching 45 (8.71%) reports.

B) CT Scan: Out of 107 (100%) patients in CT scan department, there was delay in dispatching 40 (37.38%) reports.

C) MRI Scan: Out of 76 (100%) patients in MRI scan department, there was delay in dispatching 22 (28.94%) reports.



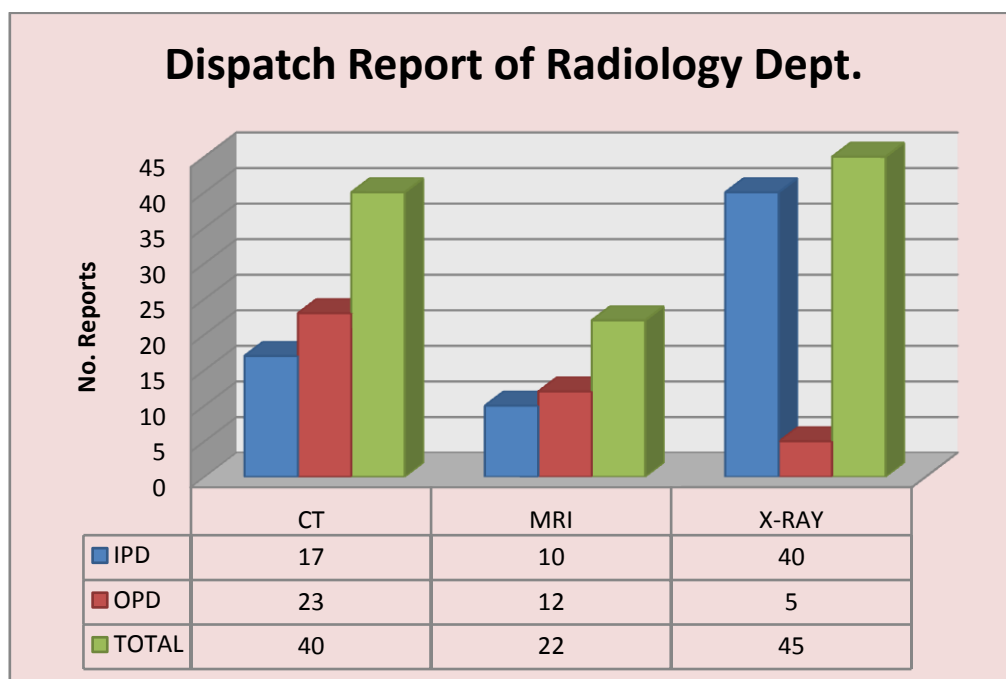
CT Scan has highest delay in dispatching reports i.e. 37.38% while MRI Scan was 28.94% and lowest was of X-Ray dispatching reports 8.71%.

Distribution of delay in reports according to IPD and OPD:

A) CT Scan: Out of 40 delayed reports, 17 reports are from IPD and 23 reports are from OPD.

B) MRI Scan: Out of 22 delayed reports, 10 reports are from IPD and 12 reports are from OPD.

C) X-Ray: Out of 45 delayed reports, 40 reports are from IPD and 5 reports are from OPD.



Delay in dispatching of reports was highest of X-Ray related to IPD patients i.e. 40 while lowest were of MRI Scan which had only 10 reports of delay.

Delay in dispatching of reports was highest of CT Scan related to OPD patients i.e. 23 reports while lowest was of X-Ray which had only 5 reports of delay.

Delay in Despatching Reports (In Days):

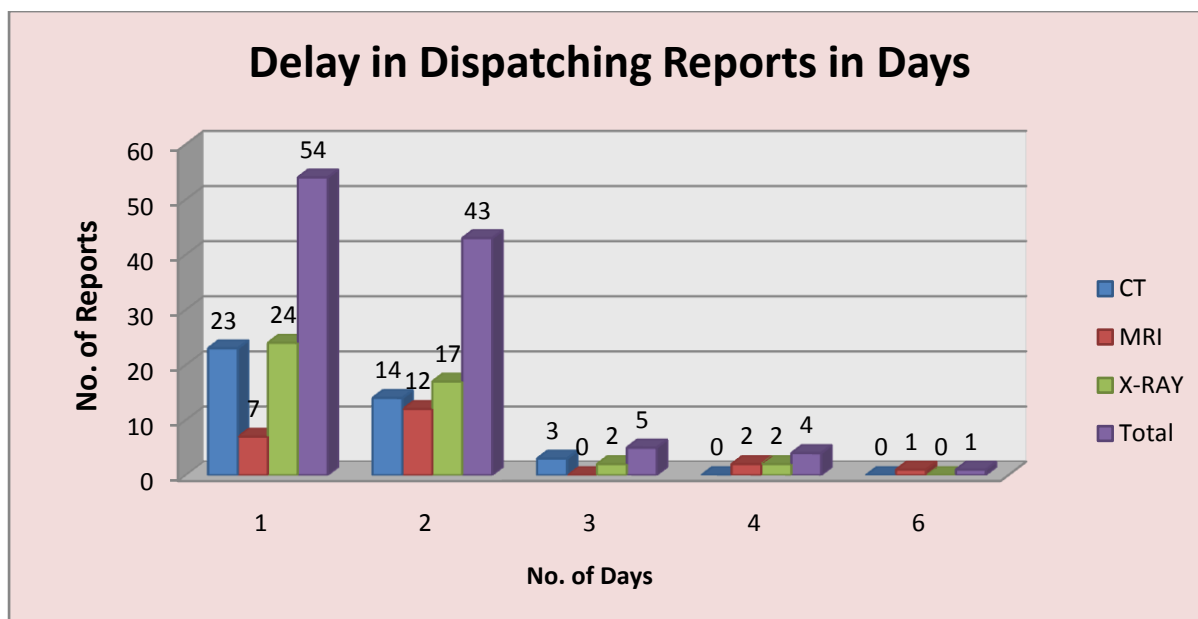
Delay of 1 day: Out of 54 delayed reports, CT scan has 23 cases, MRI Scan has 7 cases and X-ray has 24 cases.

Delay of 2 days: Out of 43 delayed reports, CT scan has 14 cases, MRI Scan has 12 cases and X-ray has 17 cases.

Delay of 3 days: Out of 5 delayed reports, CT scan has 3 cases and X-ray has 2 cases.

Delay of 4 days: Out of 4 delayed reports, MRI scan has 2 cases and X-ray has 2 cases.

Delay of 6 days: only MRI has delay of 1 reports.



As Per ABMH standard protocol reports should be dispatched within 2hrs after completion of procedure. From above graph, maximum time taken for dispatching of reports is 6 days and minimum of one day; Maximum reports (54) were dispatched after one day while 43 reports were dispatched after two days. Minimal reports were dispatched between 3 to 6 days after completion of procedure.

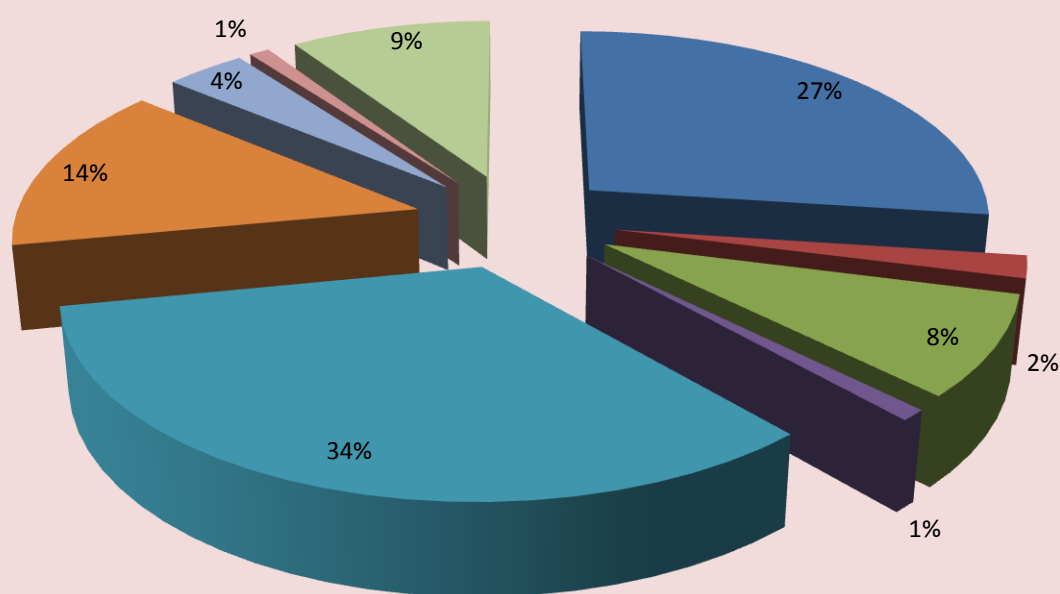
Percent wise Distribution of Delay in Dispatching Reports:

From the observational study major reasons for delay in dispatching reports are as follows

- Radiologist was busy
- Report printing was not done by technician
- Not dispatched by housekeeping
- Transcriptionist was unavailable
- Dispatch book was incompletely filled by technician

Percent wise Reasons for Delay in Dispatching Reports

- Report printing was not done by technician
- Dispatch book incompletely filled by technician
- Radiologist was busy
- Software Problem
- Transcriptionist was unavailable
- Houskeeper not intimated to dispatch reports
- Didn't get request form to radiologist
- Not dispatched by housekeeping
- Absence of clinical findings on request form

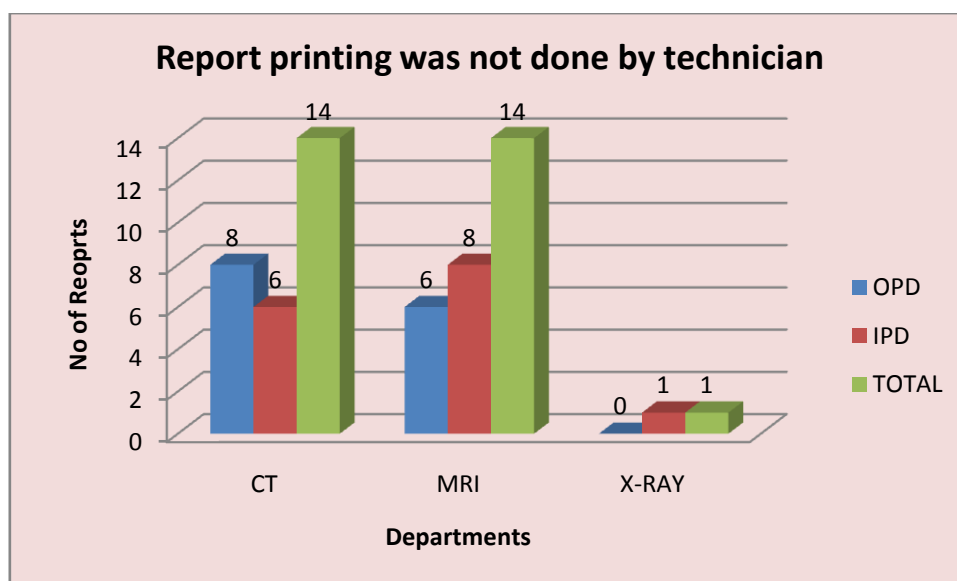


Reason with highest percentage was “radiologist was busy” which has 34%, second reason was “report printing was not done by technician in required time” which accounts to 27%. Third reason for delay was “reports not dispatched by housekeeping” i.e. 14%.

“Housekeeper not intimated to dispatched reports” contributed 2% delay in dispatching reports and lowest contribution of reasons for delay in dispatched reports was “didn’t get request form to radiologist” and “absence of clinical findings on request form” which counts to 1% respectively.

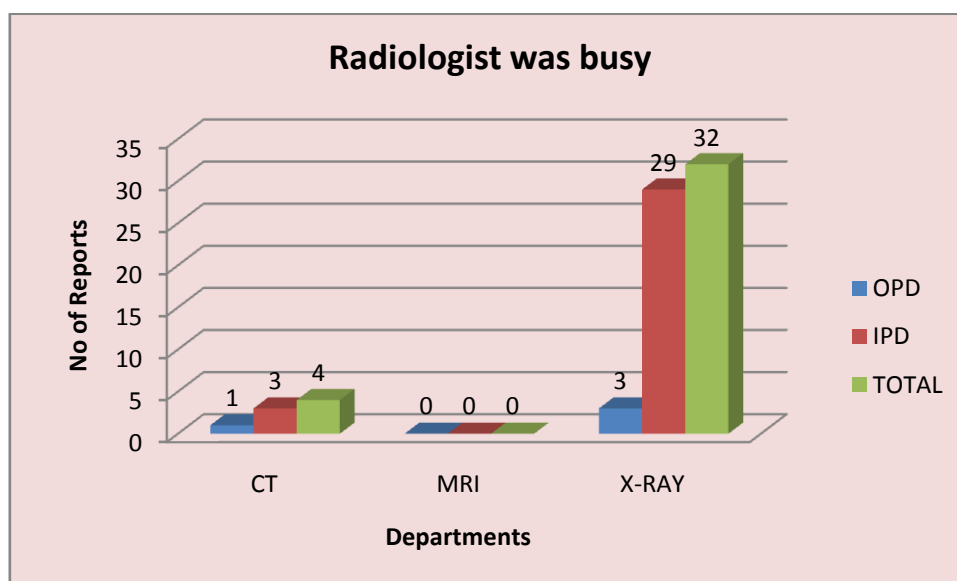
Report printing was not done by technician:

With comparison to X-Ray (1), Maximum CT (14) and MRI Scan (14) reports were delayed because of above reason. For CT scan delayed reports for OPD and OPD are 8 and 6 respectively while that of MRI Scan delayed reports were 6 and 8 respectively.



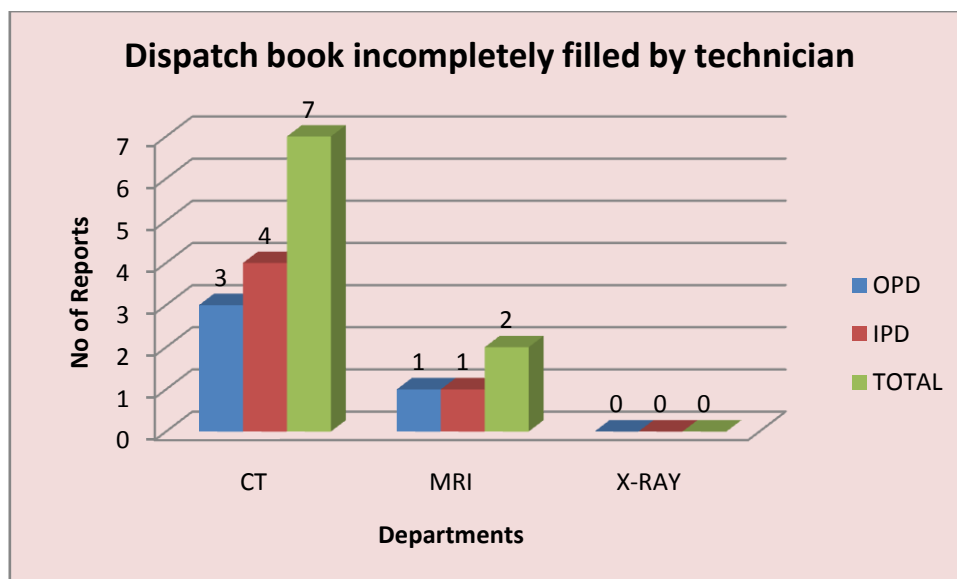
Radiologist was busy:

In X-Ray department delay of reports were found in 32 cases which comprise 29 reports of IPD and 3 reports of OPD.



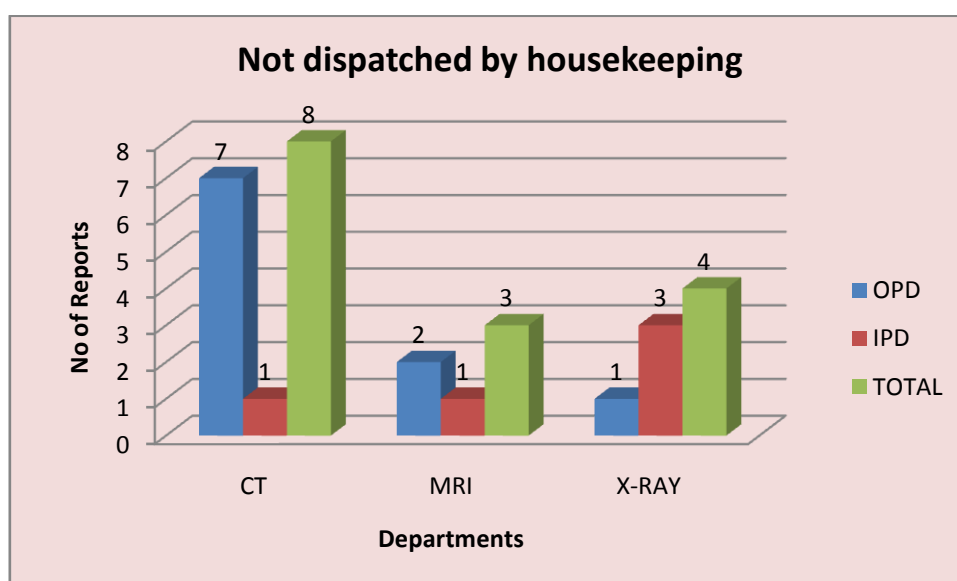
Dispatch book incompletely filled by technician:

This reason was found only in CT and MRI. CT scan had 7 such cases comprising 3 and 4 cases of OPD and IPD respectively.



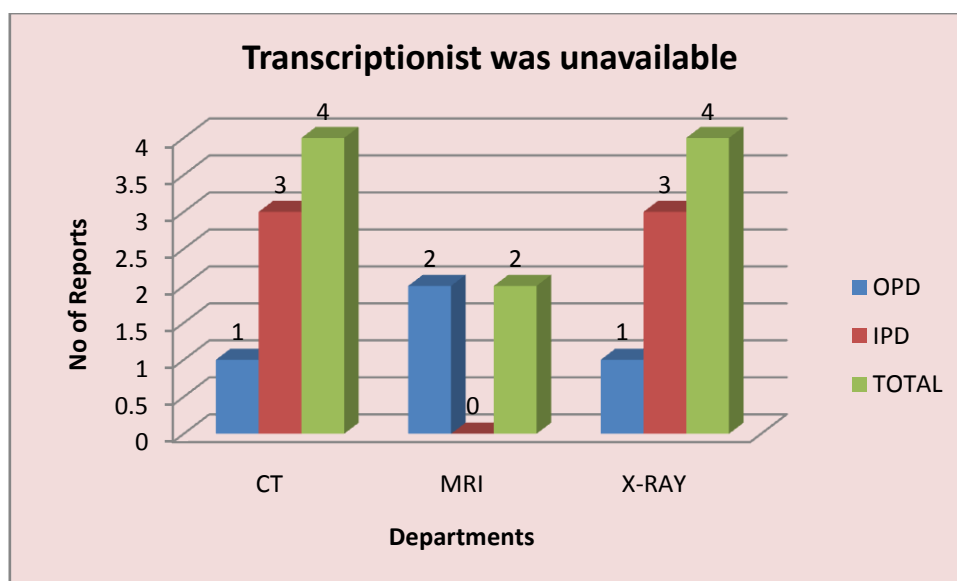
Not dispatched by housekeeping:

This reason was predominantly found in CT scan dispatching which had 8 cases comprising 7 cases of OPD and 1 case of IPD, while MRI and X-Ray had 3 and 4 cases respectively. As per standard protocol of ABMH, Pune report dispatching should be done thrice a day but on observation it was found that this procedure was done once or twice a day i.e. either at 10 AM or 10 PM.



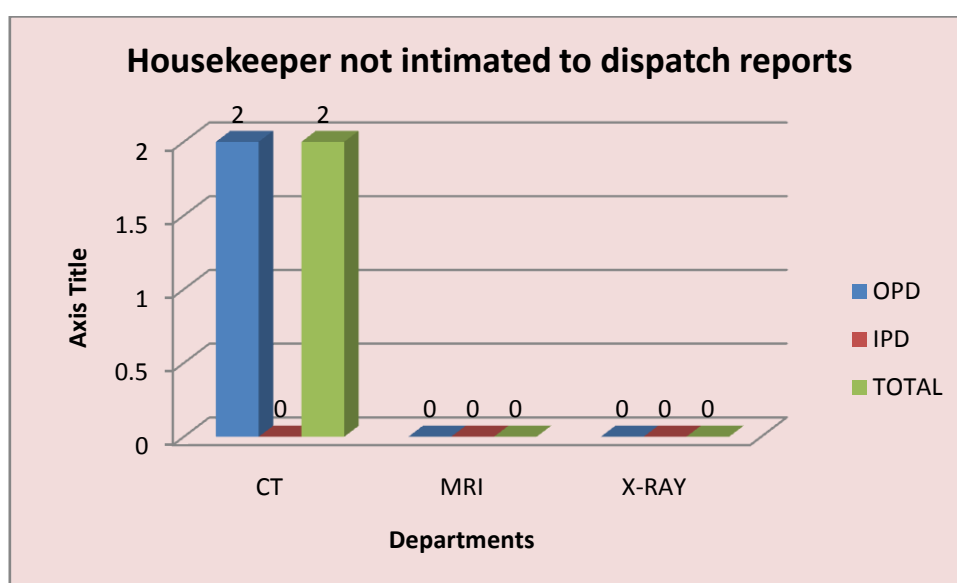
Transcriptionist was unavailable:

With comparison to MRI (2), Maximum CT (4) and X-Ray (4) reports were delayed because of above reason. For CT scan and X-Ray delayed reports for OPD and OPD are 1 and 3 respectively.



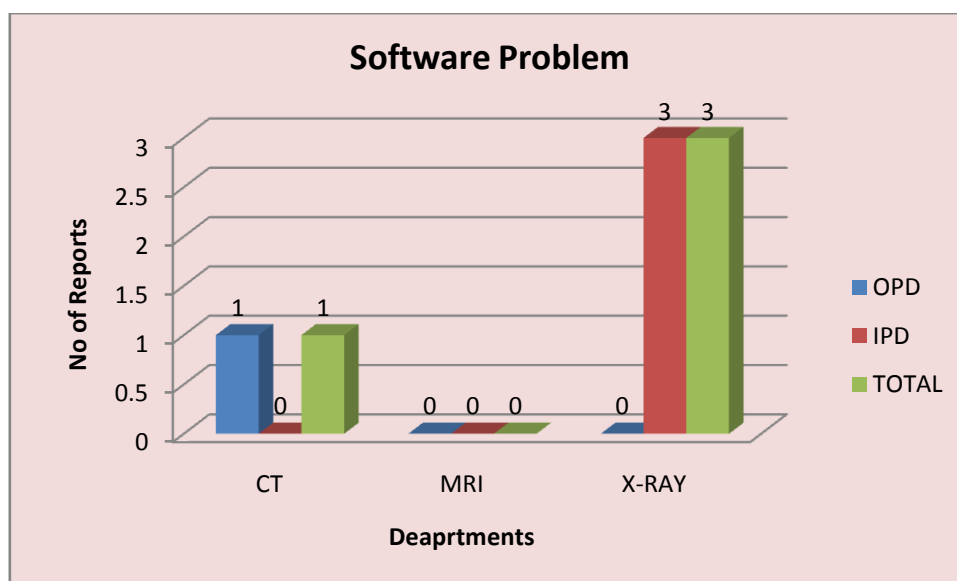
Housekeeper not intimated to dispatch reports:

2 cases of OPD in CT scan had delayed in dispatching reports because of this reason.



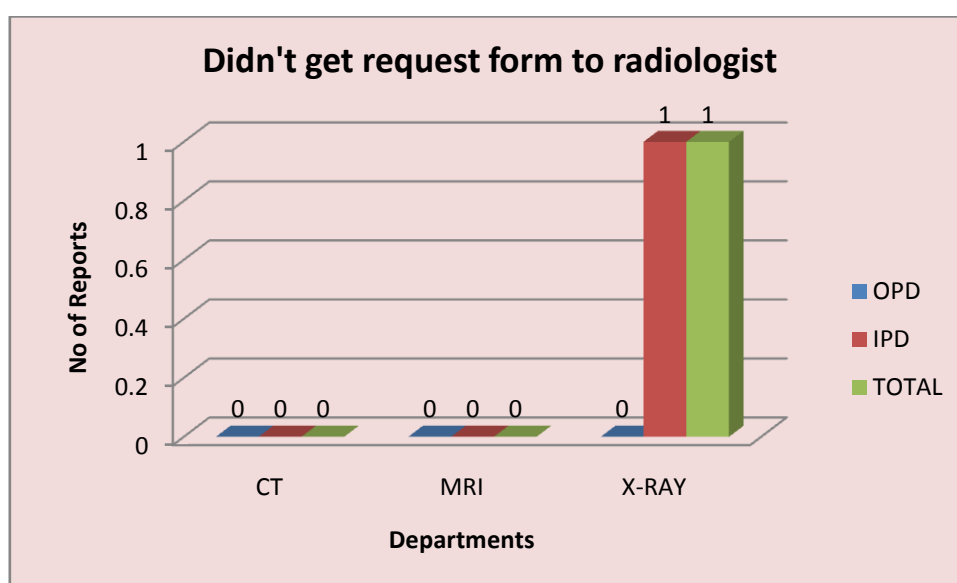
Software Problem:

3 cases of IPD in X-Ray and 1 case of CT Scan had delayed in dispatching reports because of this reason.



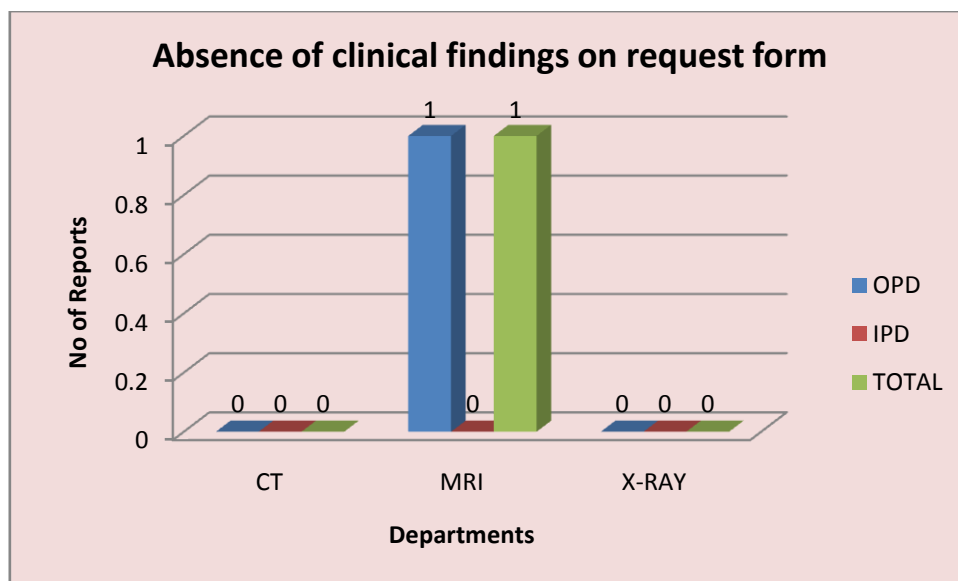
Didn't get request form to radiologist:

1 case of IPD in X-Ray had delayed in dispatching reports because of this reason.



Absence of clinical findings on request form:

1 case of OPD in MRI had delayed in dispatching reports because of this reason



Recommendation

- Presently there are 5 radiologists working under radiology department so appropriate scheduling of these radiologists will decrease their work load. Reporting of all procedure carried out in radiology department should be done as per following schedule

Time	Number of Radiologists
8 AM to 2 PM	1
11 PM to 5 PM	2
2 PM to 8 PM	1
8 PM to 8 AM	1

- Time: 8 AM to 11 AM- one radiologist will see all modalities in this time.
 - Time: 11 AM to 2 AM – 3 radiologists are available at this time so proper allocation of each modality should be there.
 - Time: 2 AM to 5 PM - 3 radiologists are available at this time so proper allocation of each modality should be there.
 - Time: 5 PM to 8 PM- one radiologist will see all modalities in this time.
 - Time: 8 PM to 8 AM – One Radiologist will be on call.
- Routine follow up by floor manager whether work assigned has been done properly like in the case report printing was not done by technician in required time or not and allocation of resources to particular staff, Not dispatched by housekeeping and dispatch book was incompletely filled.
 - At present one transcriptionist is there. Present timing of transcriptionist is 11.30AM to 7.30PM. Instead of that add another transcriptionist to resolve this problem. As one transcriptionist has workload.
 - Reports can be e-mailed to the patients as most of them have e-mail IDs so hospital can save papers and dispatch process will be smooth.
 - As dispatch centre is located far away from radiology department. Patients come to radiology department to receiving reports and further directed to dispatch centre. So this in turn serves as dissatisfaction to patients. So reports should be made available at the reception counter of radiology department.

Reference

1. http://www.wakehealth.edu/News-Releases/2012/Patients_Want_Immediate_Access_to_Radiology_Test_Results_Even_if_Theyre_Complicated_and_Contain_Bad_News.htm
2. <http://www.auntminnieeurope.com/index.aspx?sec=ser&sub=def&pag=dis&ItemID=607708>