

**Summer Training at
Fortis Hospital Noida
(April - June, 2013)**

**TIME AND MOTION STUDY OF RADIOLOGY
DEPARTMENT**

**By
Priyanka Singh**

**Under the guidance of
Mr. Vijay Pratap Raghuvanshi**

**Post Graduate Diploma in Hospital and Health Management
2012-2014**



**Institute of Health Management Research,
Jaipur
2013**

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CERTIFICATE

This is to certify that Dr. Priyanka Singh student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from Institute of Health Management Research, Jaipur, Batch 17th has undergone summer training in Fortis Hospital Noida and has done study on:

Time and Motion study of Radiology Department.

The candidate has successfully carried out the mentioned study assigned to her during her summer training from 1st April 2013 to 1st June 2013 and her approach to the analysis has been sincere, scientific and analytical.

I wish her success in all her future endeavors.



Vijay Pratap Raghuvanshi
Assistant Professor
Faculty and Mentor
IIHMR, Jaipur



Dr. Ashok Kaushik
Dean, Academic and Student Affairs
IIHMR, Jaipur

Manpower Development Programme

This certificate is awarded to

Dr. Priyanka Singh

In recognition of having successfully completed her
Internship in the department of

Patient Care Services

From

April 1st, 2013 – May 30th, 2013

At Fortis Hospital, NOIDA

She comes across as a committed, sincere & diligent person who has a
strong drive & zeal for learning

We wish her all the best for future endeavors.


Smita Angrish
Training & Development


Alfons Madoc
Zonal Head
Human Resources



DECLARATION

I Dr.Priyanka Singh student of Indian Institute of Health Management Jaipur declare that the project entitled “Time and Motion study in Radiology Deptt. Fortis Hospital Noida” has been completed under the guidance of Mrs. Neeru Raina (Head of deptt.) patient care services, from 1 April to 30 May 2013.The findings generated in the project work are based on the information collected by me and are solely meant for the academic purpose.

I also declare that I will not be using the data and finding anywhere else, it will be purely for project report to be submitted in the college.

Dr.Priyanka Singh

IIHMR Jaipur

ACKNOWLEDGEMENTS

I own my sincer thanks to Dr.Ashok Kaushik Dean,Academic and Student Affairs of IIHMR,Jaipur for inspiration, valuable and prompt advice, sound and scholarly guidance.

I am thankful to VijayPratap Raghuvanshi Assistant professor Faculty and Mentor IIHMR Jaipur for his valuable guidance and cooperation at each step in carrying out this endeavor.

I am highly grateful to all the staff member of Radiology & Patient care service department of Fortis Hospital Noida for giving me their gentle support and cooperation.

Date

CERTIFICATE

It is certified that the the work contained in the project entitled “Time andMotion study in Radiology Deptt” has been carried out under my supervision, and this work has been not submitted elsewhere.

Mrs .Neeru Raina

(Head of Department)

Patient care services

FORTIS HOSPITAL NOIDA

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INTRODUCTION OF THE STUDY

Time and motion study of work system with the purpose of developing the preferred system and method determining the time required by a qualified and properly trained person working at a normal pace to do a specific test and operation assisting the worker the preferred method. In other word time and motion study is that study which produces a method to establish the best way to perform a task .A method created to determine the correct time it takes to complete a certain task.

Time and motion study was first advocated by Fredrick K.Taylor in his book scientific Management in order to create a management standard for evaluating individual employee productivity.

Time and motion depends upon following factors mentioned below

1) Machinery:-

Machinery of the department should be sound. No technical problem associated or existed .So for the good productivity and less time and motion machinery should be technically healthy quality of machinery should be of higher level, maintenance of machinery should be good and their should be no error in the machine .Machine might be handled smoothly, no technical problem should come during handling of the machine.

2) Management:-

Management should promote those activities which are helpful to reduce the time and motion in conducting a task and management should strategically plan all the system in the organization so that in completing

the task time and motion might be diploid very less with good quality of services.

3) Human factor:-

Human factore is a very important factor for time and motion in the organization because it is the active part of organization which deals with machines result.

Human factore science :- The science of understanding the properties of human capabilities.

Human factors engineering:- The application of this understanding to the design & development of systems and services.

Human factor Integration :- The art of ensuring successful application of human factors engineering to a program.

Human factors method:-

- a) Activity analysis – Like what is task, how much time spent for completing the task and what people are doing etc.
- b) Ethnographic analysis-What devices or tools are used and how much time spent.
- c) Focus group-Who is the focus group, what type of people in the organization is focused.
- d) Subject in tandem-discover usability difficulty.
- e) Prototyping-Addresses design & layout issues.

INTRODUCTION TO THE COMPANY



Vision & Values

"To create a world-class integrated healthcare delivery system in India, entailing the finest medical skills combined with compassionate Patient care"

**-Late Dr. Parvinder Singh,
Founder Chairman,
Fortis Healthcare (India) Limited**

Fortis health care, established by the promoters of Ranbaxy laboratories, Is the fastest growing health care provider in India. The company was founded by the visionary business leader, late Dr. Parvinder Singh, the architect of Ranbaxy .Ranbaxy is today one of the top ten global generic pharmacy players with a presence in over 100 countries

The amalgamation of the Fortis escorts competencies is setting bench mark for health care delivery in India .This development has facilitated Fortis to become the –

- World's largest health care chain in cardiac care program.
- Second largest health care delivery chain in India.
- Leader in health care in northern India.

Hospital chain of Fortis healthcare group:-

-Fortis Hospital Noida.

-Fortis Hospita Delhi .

-Fortis Hospital Vasant Kunj New Delhi .

-Escorts Heart Institute and Research Centre Limited New Delhi.

-Fortis Hospital Faridabad.

-Fortis Hospital Raipur.

-Fortis Hospital Amritsar.

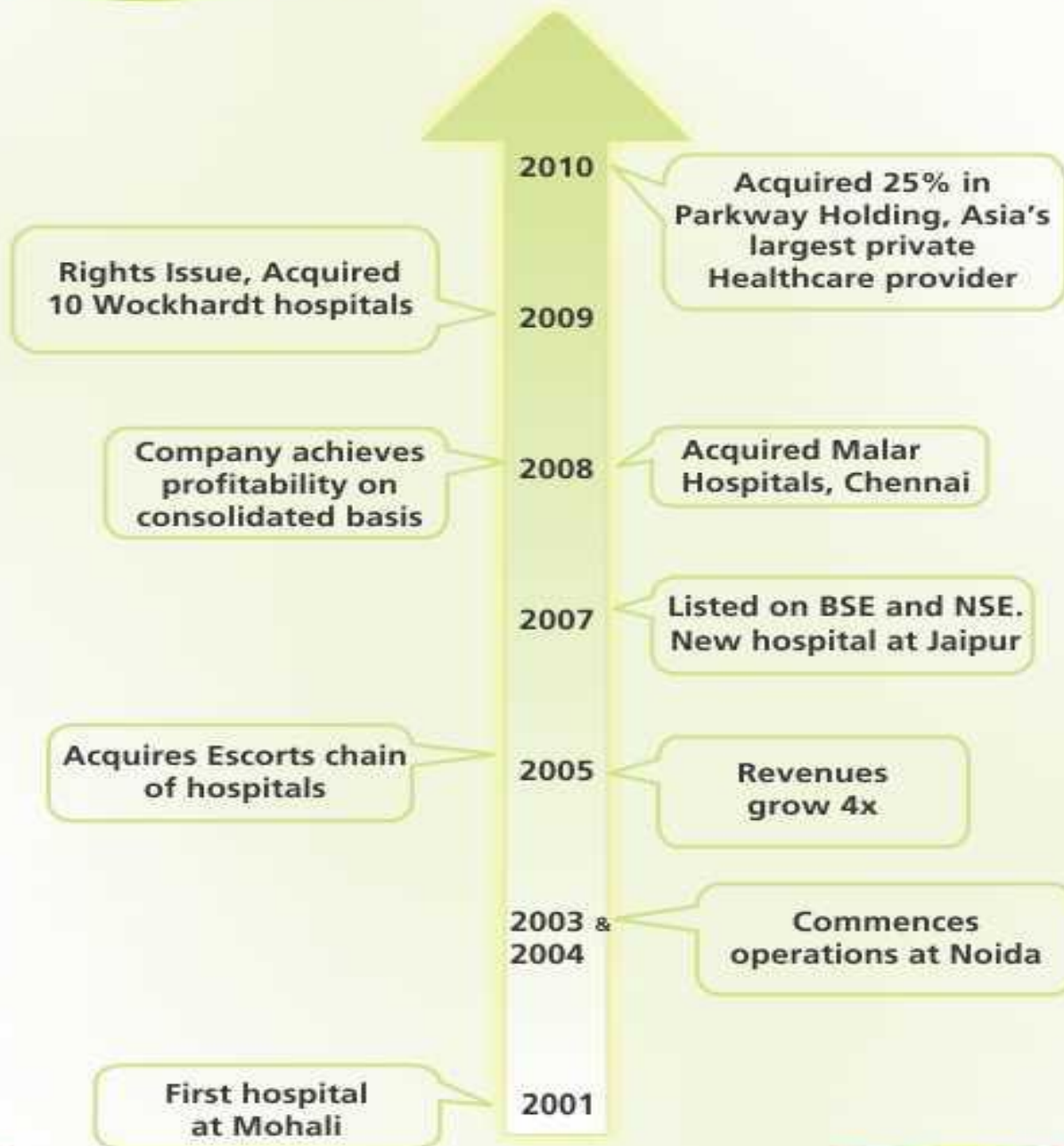
-Fortis Hospital Mohali.

-Fortis Hospital Jaipur.



MILESTONES

India's Fastest Growing Hospital Chain



Group Companies:-

-Ranbaxy Laboratories Limited and SRL Ranbaxy limited.

- Religare Limited.

-Fortis health world.

-Fortis clinical research -Fortis health staff .

INTRODUCTION OF HOSPITAL

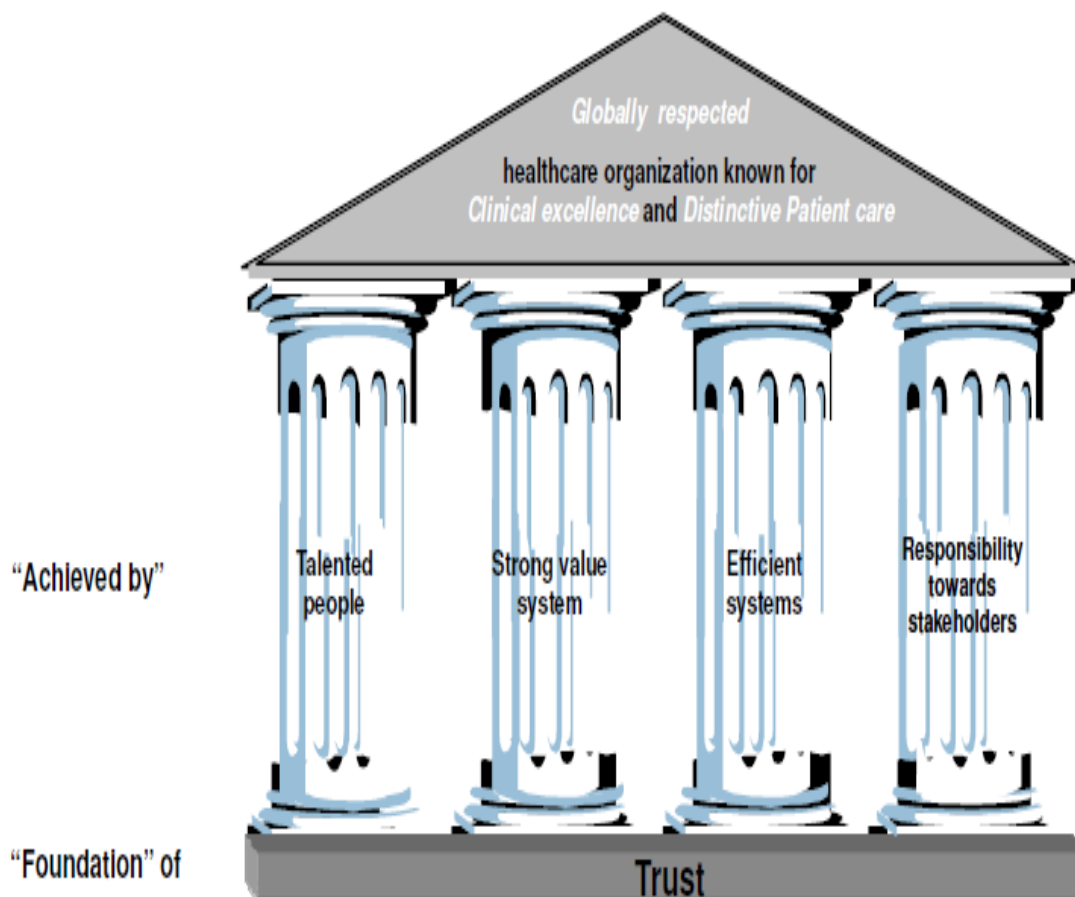


The Fortis Edifice.....

“Vision”

“To create a world-class integrated healthcare delivery system in India, entailing the finest medical skills combined with compassionate patient care”

“Achieved by”



“Foundation” of

Virtuous Values

Vision: Imbibe and share the vision.

Integrity: Lead through honesty and integrity.

Respect: Earn respect.

Trust: Gain patient trust.

Understanding: Commit to compassion, care and understanding.

Own: Own quality excellence.

Uphold: Uphold innovation and continuous improvement.

Share: Develop and share success.

Fortis_hospital Noida which got operational in july 2004 is the fourth project of Fortis health care .Indias fast growing health care provider and already the country's second largest hospital chain .Fortis hospital provides world class medical care to patients in the states of Uttrakhand, Haryana ,UP,Delhi, Rajasthan

-Super Specialty Services:-

- Cardiology.
- Cardiac Surgery.
- Joint Replacement and General Orthopaedic.
- Neuro Surgery.
- Urology including Renal Transplant.

-Multispeciality Services:-

- Rheumatology.
- Ophthalmology.
- Dentistry.
- ENT
- Pediatric (including Pediatric Nephrology and Endocrinology)
- Gynaecology and Obs (Gynae Oncology).
- Generic medicine.
- Dentistry.
- Gastroentrology
- Endocrine and metabolic Disease.
- Pulmonology and Thoracic Surgery.

-Critical care medicine.

-General surgery.

Special clinics:-

-Family Health Management.

-Growth clinic.

-Asthma clinic.

24 Hour Services:-

-Emergency.

-Blood Bank.

-Laboratory.

-Radiology

-Ambulance.

-Dialysis.

-Pharmacy.

Non Medical Facilities:-

-Book shop.

-Cafeteria.

COMMUNITY OUT REACH PROGRAMS:-

-Free Health Camps.

-Special services to interational patients.

-Tele-medicine.

RADIOLOGY DEPARTMENT OF FORTIS HOSPITAL NOIDA

In the health care there are three levels of health care which are –

- Primary health care (prevention).
- Secondary health care (therapeutic).
- Tertiary health care (rehabilitati).

For all these three levels of health care diagnostic part is a very important part which plays a vital role to treat the disease of patient of either level because it is first step which distinguish the line of treatment, and after the diagnostic part therapeutic part takes its way.

For the diagnosis of disease there are various modes of diagnosis like pathological lab test and radio imaging test etc.

Radiology department of Fortis hospital is ornamented with latest modern technologies of radiology. It is integral part of hospital which is located on ground floor .

Radiology department has numerous procedures to rule out the disease or pathology which are as x-ray, ultrasound,MRI, Mammography ,Doppler study.

In Fortis hospital radiology department has appropriate facility of following procedures.

- X-ray conventional method .
- X-ray digital.

- X-ray study-intra venous urography.
- X-ray study-intra venous pyelography.
- Hystero salpingo graphy.
- Barium meal studies.
- Doppler study.
- Ultrasonography.
- Mammography.
- MRI (magnetic resonance imaging).
- CT (computer tomography).

Special features:-

Radiology department of Fortis hospital has latest advance technologies which are based on international standards of Radiology it includes-

- P.A.C.S (Picture archival and communication system).
- Computer radiography.
- Digital radiography.
- Advance developer.

OBJECTIVES OF RADIOLOGY

- To provide comprehensive high quality imaging service.
- To establish and confirm clinical diagnosis.
- To provide high quality therapeutic radiology.
- To provide opportunities for training and research.

LOCATION

This department is located at ground floor away from main traffic, very close to emergency and it has easy access to OPD. So access to this department is very easy to all patients either normal serious or emergency patient there is proper arrangement of lift for the IPD patients. Patient waiting area, reception cum registration counter, office of nursing and technical staff, store for supplies, circulation space for movement of patients, staff, trolley and stretcher is to be provided.

LAY OUT PLAN OF RADIOLOGY DEPARTMENT

- Layout has minimum number of doors.
- Primary x-ray beam shouldn't be directed toward dark room, door, windows etc.

Size

- Depends on the size of the hospital.
- No of machines installed.
- 1.5 Tesla MRI scanner.
- 64 slice CT scanner.

- 4 X-ray units.
- 2 Ultrasound units.
- 1 Mammography machine.
- 1 Bone dexa machine.

Room size

The X-Ray unit of Fortis hospital is in 18 sq m for general purpose radiography and conventional fluoroscopy equipments. The size of room housing the gantry of the CT unit is in 25 sq m.

OPENING & VENTILATION

- Unshielded opening.
- For ventilation & natural light.
- Above height of 2m from floor level.

ILLUMINATION CONTROL

The rooms are designed in such a way that adequate darkness achieved conveniently when desired.

ULTRASOUND

The radio-diagnosis is that branch of medicine that makes diagnostic images of anatomic structures through the use of electromagnetic radiation or sound waves and that treats disease through the use of radioactive compounds. Radiological imaging techniques include X-Rays, CAT scans, PET scans, MRIs, and ultrasonograms. No field has seen such rapid change as radiology in the past few decades. Because of use of ultrasonic and magnetic waves for imaging the services are called imaging services instead of radiological services. The outshoots of radiology department which use radiation for diagnosis or treatment are nuclear medicine and radiotherapy sciences.

1960's - The principles of sonar were applied to diagnostic imaging. Ultrasonic waves generated by a quartz crystal were reflected at the interfaces between different tissues, received by the ultrasound machine and turned into pictures using computers and reconstruction software. Challenges include targeted contrast imaging, real time 3D or 4D ultrasound and molecular imaging.

The textbook definition of ULTRASOUND is energy generated by sound waves of 20,000 or more vibrations per second. Ultrasound is used in an array of imaging tools. Used for medical diagnostics, ultrasound uses sound waves far above the frequency heard by the human ear. A transducer gives off the sound waves and receives

reflected back waves from organs and tissues, to make a picture of organs. Examining the health of an unborn baby, analyze bone structure or looking for tumours, Ultrasound is used in many ways.

Process

Sound waves are a type of mechanical vibration. They are described in terms of their frequency, which is the number of repetitions (i.e., cycles) per second. The unit for measuring frequency is the Hertz (Hz). The ultrasound image is created by first transmitting sound waves into the body and then interpreting the intensity of the reflected echoes. This is achieved using a hand held probe which contacts the body via a water based gel. The data collected is then processed within the body of the scanner and displayed as a black and white image generally referred to as grey scale.

3D ultrasound works by creating a dataset of a large number of 2D images, or planes. Once all this 2D data is assembled in one place, one can see through the various 2D planes in rotation, just as flipping through the pages of a book. The process creates multi-planer images and looks like 3D image. 4D ultrasound, or “real-time 3D ultrasound,” rests on the concept that as computers grow ever more powerful, we can now use ultrasound equipment to acquire and display 3D data sets in real time, as a patient is being scanned.

X-Ray:

One of the most familiar types of radiology equipment is the X-Ray machine. An X-Ray machine uses X-Rays, which are a kind of electromagnetic radiation, to produce images of the inside of a person's body. X-Ray machines send photons, which are particles of X-Rays, through a person's body, and special film captures the images. Often, people have X-Rays during routine dental examinations, but this technology is also used to give doctors a view of many different parts of the body.

Computed Axial Tomography (CAT):

A CAT scanner is another type of radiology equipment that allows doctors to see the inside of a person's body. CAT scanning equipment produces cross-sectional images of the area under examination, which can be viewed on a special computer monitor or printed out for later use and analysis. Often, CAT scans are used instead of X-Rays when a medical professional needs to obtain clearer images of a patient's organs, bones, and even blood vessels. These tests provide more detailed images than X-Rays can.

CAT scans work in a similar manner to X-Rays. With this procedure, many X-Rays rotate around the patient along with special electronic detectors. The examination table moves inside the scanner to ensure the required images are obtained. A computer takes the data produced by the scanner and creates cross-sectional images of the inside of the body. The various types of scanners in use are as under. The high-resolution images produced by these machine present views of a thin slice of the area under examination. Often, this machine is used to view parts of the

body that are harder to evaluate with other types of imaging. For example, an MRI machine is better for capturing images of the spinal cord than X-Ray and CAT scan machines are.

Conventional Scanners

: The conventional CT scanner was the first CT scanner that was put into practice in the 1970s. At the time, these scanners were considered revolutionary. This scanner was produced before wireless technology, so large cables are attached to one end of the rotation tube. To avoid tangling these cables, the CT scanner must be rotated in reverse after each picture rotation. This resulted in a longer scanning time.

Spiral Scanners

Spiral CT scanners were introduced in use in 1989 and sped up the time needed for a CT scan. The reason for the increase in CT scanning times is due to the ability of spiral scanners to rotate continually in one direction while the patient is moved through the scanning ring. The increase in scanning speed of the spiral CT scanner also enabled thinner picture slices of the area being scanned, which can assist the doctor in diagnosis

Multislice Scanners:

In 1998, the next generation of CT scanners was introduced in form of the multislice scanner. This scanner enables doctors to capture multiple image slices during the rotation of the CT X-Ray tube. This capability has sped up the amount of time needed to complete CT scans over that of the spiral scanner. The image slices captured by the multislice scanners are also thinner than those that are attainable with the spiral scanner. The technology of the multislice scanner was released in 1998 but was and improved upon until 2001.

Cone Beam CT Scanner

Through the use of a cone shaped X-Ray beam, the size of the scanner, radiation dosage and time needed for scanning are all dramatically reduced. A typical CBCT scanner can fit easily into any dental (or otherwise) practice and is easily accessible by patients. The time needed for a full scan is under one minute and the radiation dosage is up to a hundred times less than that of a regular CT scanner.

Electron Beam Scanners

Also known as ultrafast CT scanners, the electron beam scanner uses a completely different technology than the rest of the CT scanners. A focused electron beam is created from an electron gun. This eliminates the need for moving mechanical parts and results in the fastest CT

scanning times that have been accomplished to date. Electron beam scanners were first used to scan organs that move, such as the heart and lungs. The fast scanning capability of this scanner enables pictures to be captured as a still picture even though the organ is still in motion inside of the patient.

Magnetic Resonance Imaging (MRI)

An MRI machine is another important piece of radiology equipment. This type of machine uses a magnetic field of a great magnitude (measured in Tesla), instead of radiation, to obtain images of the inside of a person's body. With this machine, an electric current and wire coils are used to produce a magnetic current. The magnetic field then stimulates water molecules to align, and radio waves cause them to give off signals. These radio waves are sent to

Positron Emission Tomography Scan (PET):

Positron emission tomography) is a nuclear medical imaging technique that produces a three-dimensional image or picture of functional processes in the body. The system detects pairs of gamma rays emitted indirectly by a positron-emitting radionuclide (tracer), which is introduced into the body on a biologically active molecule. Three-dimensional images of tracer concentration within the body are then constructed by computer analysis. In modern scanners, three

dimensional imaging is often accomplished with the aid of a [CT X-Ray scan](#) performed on the patient during the same session, in the same machine.

A PET scan can measure such vital functions as blood flow, oxygen use, and glucose metabolism, which helps doctors identify abnormal from normal functioning organs and tissues. The scan can also be used to evaluate the effectiveness of a patient's treatment plan, allowing the course of care to be adjusted if necessary.

Currently, PET scans are most commonly used to detect cancer, heart problems (such as coronary artery disease and damage to the heart following a heart attack), brain disorders (including brain tumors, memory disorders, seizures) and other central nervous system disorders.

Mammography:

Mammography is a specific type of imaging that uses a low-dose [X-Ray](#) system to examine breasts. A mammography exam, called a mammogram, is used to aid in the early detection and diagnosis of breast diseases in women. Digital mammography, also called full-field digital mammography (FFDM), is a mammography system in which the X-Ray film is replaced by solid-state detectors that convert X-Rays into electrical signals. These detectors are similar to those found in digital cameras. The electrical signals are used to produce images of the breast that can be seen on a computer screen or printed on special film similar to conventional mammograms. From the patient's point of view, having a digital mammogram is essentially the same as having a conventional film mammogram

Digital Imaging:

In radiological imaging, internal body parts are converted to visible image. The medium to capture the images can be the absorption of X-Ray in different tissues, reflection of the ultrasound waves from the tissue borders, magnetic resonance or the distribution of radioisotopes in the body.

In diagnostic radiology, the generated information can be recorded in two ways, the analogue and the digital mode. Analogue images in these days are only used in radiography. They could be snapshots, made on film, or dynamic examinations, when in fluoroscopy the X-Rays are amplified with an image intensifier, and they are visualized on a display. With this technique, we can examine the processes in real time (for example we can image the progress of the contrast material through the oesophagus during swallow fluoroscopy).

In digital imaging, the physical signals are transformed into electric impulses, and after it, these signals are recorded in the computer's memory as digital codes. The basic element of the image is the pixel. The pixels can be imagined as little squares

arranged in a grid. Every pixel is a sample of an original image. The more samples are taken, the more, and lesser size pixels can be obtained, and the higher resolution and accuracy reached. After a digital image is created, it is possible to change the images' parameters. The most important and basic is the possibility of altering the brightness and the contrast. The contrast in radiography is the difference between two adjacent pixels' intensity. The more

difference between these intensities, the more the structures can be separated sharply

Fluoroscopy:

The first fluoroscopes consisted of an X-Ray source and fluorescent screen between which the patient would be placed. As the X-Rays pass through the patient, they are attenuated by varying amounts as they interact with the different internal structures of the body, casting a shadow of the structures on the fluorescent screen. Images on the screen are produced as the unattenuated X-Rays interact with atoms in the screen through the photoelectric effect, giving their energy to the electrons. While much of the energy given to the electrons is dissipated as heat, a fraction of it is given off as visible light, producing the images. Early radiologists would adapt their eyes to view the dim fluoroscopic images by sitting in darkened rooms, or by wearing red adaptation goggles.

The invention of X-Ray image intensifiers in the 1950s allowed the image on the screen to be visible under normal lighting conditions, as well as providing the option of recording the images with a conventional camera. Subsequent improvements included the coupling of, at first, video cameras and, later, CCD cameras to permit recording of moving images and electronic storage of still images.

Fluoroscopy is used in many types of examinations and procedures. Some examples include

- Barium X-Rays and enemas (to view movement through the GI tract)
- Catheter insertion (to direct the placement of a catheter during angioplasty or angiography)
- Blood flow studies (to visualize blood flow to organs)
- Orthopedic surgery (to view fractures and fracture treatment).

Planning

Planning has three aspects which should be considered for planning of any department of the hospital. They are as under:

Physical Planning

- Development Planning.
- Staffing.
- Integration with Health Providing Services.
- Separate for Indoor and Outdoor Services or not.

Visionary Planning

- Planned Infrastructure.
- Anticipate for Future Change.
- Best use of Available Space.
- Planning Imaging Environment (Radiation Hazards).

Strategic Planning

- Addition of New Technology.
- Integration in Health System.

Source of patients:-

-OPD.

-IPD.

-Emergency.

-Referred patients.

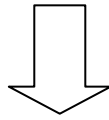
-From others hospital.

Appointments:-

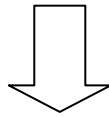
- Referred patients.
- PHC patients.
- Patients from other hospital.
- Direct patients.

PROCESS FLOW OF USG OBSERVED DURING THE STUDY

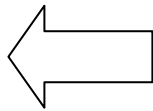
Clients came on the radiology counter with a prior appointment.



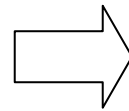
Radiology coordinator keeps the bill in order.



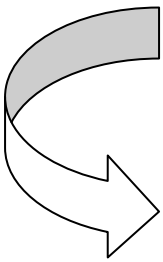
No



Is client's bladder full

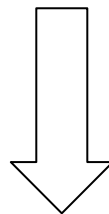
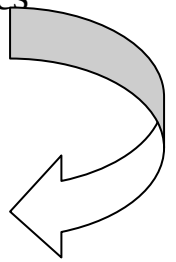


Yes



(Told to drink water)
after that USG get
done

(Get USG done)



(Finishes the test)

DATA ANALYSIS

<u>Patient name</u>		<u>Age</u>	<u>Sex</u>		<u>Package</u>	<u>Date</u>	
1	saaurav verma	26	M	407318	Tata mcgraw hill executive	1/4/2013	9:00
2	manas mrinal	23	M	407319	Tata mcgraw hill executive	1/4/2013	9:15
3	neha nigam	36	F	407323	Comprehesive package	1/4/2013	9:30
4	o k khullar	75	M	313316	Fortis 10 years package	1/4/2013	9:50
5	b d roy	63	M	201	Fortis 10 years package	1/4/2013	10:10
6	urmila roy	62	F	200	Fortis 10 years package	1/4/2013	10:25
7	mohan lal	45	M	407291	CGHS executive	2/4/2013	9:30
8	c p s bakshi	46	M	407289	CGHS executive	2/4/2013	9:45
9	alpana singh	28	F	406160	Adobe master executive	2/4/2013	
10	alok kumar saxena	51	M	407290	CGHS executive	2/4/2013	10:00
11	jagdish prasad sharma	53	M	407320	CGHS executive	2/4/2013	10:20
12	bishan singh	73	M	356882	Whole body package	2/4/2013	10:30
13	anupam bhandari	25	M	407800	Pearson education executive	3/4/2013	9:20
14	birender kumar badola	50	M	407804	Tata mcgraw hill executive	3/4/2013	9:50
15	shiv charan prasad	53	M	407805	Tata mcgraw hill executive	3/4/2013	10:20
16	govind ballabh tewari	55	M	407807	Tata mcgraw hill executive	3/4/2013	10:50
17	arnab saha	17	M	37761	Tata power executive	3/4/2013	11:50
18	dipanwita saha	46	M	3959	Tata power executive	3/4/2013	12:00
19	lhainem haokip	62	F	408028	Fortis 10 years package	4/4/2013	9:30
20	jagar singh		M	408044	Tata mcgraw hill executive	4/4/2013	9:40
21	sumita singh	42	F	233337	Fortis 10 years package	4/4/2013	10:00
22	shashi agarwal	63	F	408050	Comprehesive package	4/4/2013	10:15
23	sanjai kumar mishra	46	M	408037	CGHS executive	4/4/2013	10:25
24	prasoon kumar jha	47	M	408038	CGHS executive	4/4/2013	10:45
25	m p panda	76	M	247763	NTPC executive	5/4/2013	9:00
26	sumitra panda	70	F	405874	NTPC executive	5/4/2013	9:15
27	amit gupta	40	M	383461	Alstrom T & D executive	5/4/2013	9:30
28	kiran kesarwani	55	F	408357	Alstrom T & D executive	5/4/2013	9:45
29	prahlad kesarwani	63	M	408355	Alstrom T & D executive	5/4/2013	10:00
30	nitesh kumar	36	M	406981	Fortis 10 years package	5/4/2013	10:15
31	jagmohan sharma	70	M	407797	Indus towers executive	6/4/2013	9:30
32	neeraja mittal	57	F	320437	IOCL executive	6/4/2013	9:45
33	ayan mukherjee	39	M	406976	Tata power executive	6/4/2013	10:20
34	nibedita mukherjee	36	F	406979	Tata power executive	6/4/2013	10:50
35	teena miglani	31	F	408351	Toshiba executive	6/4/2013	11:00
36	o p mishra	52	M	408578	Whole body package	6/4/2013	11:20
37	ashish bhardwas	33	M	408548	Comprehesive package	8/4/2013	9:00

38	anita gupta	44	F	345050	NTPC executive	8/4/2013	9:10
39	dhirendra singh	24	M	349253	Dorling kindersley pre	8/4/2013	9:20
40	shashi prabha	62	F	408033	Fortis 10 years package	8/4/2013	9:30
41	satish kumar	63	M	408034	Fortis 10 years package	8/4/2013	9:45
42	shashi bhushan chaurasia	39	M	134997	Whole body package	8/4/2013	10:00
43	limatula yaden	44	F	88365	CGHS executive	9/4/2013	9:00
44	brajesh kumar	25	M	409074	Oberthur package	9/4/2013	9:15
45	basant lal	53	M	142438	NTPC executive	9/4/2013	9:25
46	shripal gangwar	56	M	253889	Whole body package	9/4/2013	9:35
47	hemant yadav	23	M	409078	Oberthur package	9/4/2013	9:55
48	ashok chauhan	48	M	250249	NTPC executive	9/4/2013	10:15
49	manish dublish	40	M	177383	Alstrom T & D executive	10/4/2013	9:00
50	dinesh mehrotra	58	M	408850	CGHS executive	10/4/2013	9:15
51	ankit pahuja	31	M	409220	Comprehesive package	10/4/2013	9:25
52	p subramanian	49	M	337569	CGHS executive	10/4/2013	9:35
53	sohail zaidi	29	M	409213	Deluxe package	10/4/2013	9:50
54	aswani rathore	29	M	408586	Startrack executive	10/4/2013	10:00
55	shubham jairath	34	M	409217	Religare executive	10/4/2013	10:10
56	partha sarathi bagchi	43	M	353314	Shriram pistons executive	11/4/2013	9:30
57	piyaray lal	52	M	409340	Tata mcgraw hill executive	11/4/2013	9:45
58	tulsi devi	70	F	408800	Technip KT executive	11/4/2013	10:00
59	jasjeev singh swani	43	M	305758	Whole body package	11/4/2013	10:15
60	tripat swani	38	F	305759	Whole body package	11/4/2013	10:25
61	usha prasad	71	F	85957	Fortis 10 years package	11/4/2013	10:40
62	sachin sharma	32	M	409441	Oberthur package	12/4/2013	9:30
63	alka rani chaudhary	34	F	105616	Comprehesive package	12/4/2013	9:40
64	avadh kishore jain	61	M	94616	Simon india executive	12/4/2013	9:50
65	arti jain	54	F	94134	Simon india executive	12/4/2013	10:00
66	uttam singh mayal	53	M	408030	Fortis 10 years package	12/4/2013	10:15
67	brajesh kumar	36	M	161408	Religare executive	12/4/2013	10:25
68	sanjay kumar varshney	42	M	71268	CGHS executive	13/04/2013	9:00
69	pankaj kumar singh	48	M	102485	Gail india executive	13/04/2013	9:20
70	anurag srivastava	27	M	313845	Honda siel package 4	13/04/2013	9:30
71	a k nagpal	57	M	335278	RBI executive	13/04/2013	9:50
72	anil dev	52	M	408539	Deluxe package	13/04/2013	10:00
73	ram babu	51	M	408543	Gail india executive	13/04/2013	10:25
74	hemraj	29	M	409790	Tata mcgraw hill executive	15/04/2013	9:00
75	ashok kumar panda		M	155375	Tata power executive	15/04/2013	9:15
76	rajesh jain	45	M	78837	Whole body package	15/04/2013	9:25
77	satish jain	56	M	409782	Whole body package	15/04/2013	9:35
78	virendra dutt bhagat	35	M	409781	LG executive	15/04/2013	9:50
79	vodendra kumar	29	M	409801	Ansaldo executive	15/04/2013	10:00

80	dhoop singh	60	M	396546	Basic comprehensive package	16/04/2013	9:30
81	srishti santosh sonkar	26	F	327190	NTPC executive	16/04/2013	9:45
82	panoose t t	52	M	231855	Fortis 10 years package	16/04/2013	10:00
83	vikas sharma	27	M	310522	Religare executive	16/04/2013	10:15
84	dinesh kumar	33	M	261673	Alstrom T & D executive	16/04/2013	10:25
85	lallan kumar	44	M	409951	CGHS executive	16/04/2013	10:35
86	shruti dhand	33	F	409580	Religare executive	17/04/2013	9:00
87	sandeep bachhas	27	M	409591	Religare executive	17/04/2013	9:20
88	susmit saraswat	24	M	409745	Religare executive	17/04/2013	9:35
89	sunil mishra	51	M	410164	Tata mcgraw hill executive	17/04/2013	9:45
90	dharam pal	57	M	410165	Tata mcgraw hill executive	17/04/2013	10:00
91	srishti gupta	24	F	409747	Religare executive	17/04/2013	10:20
92	chitra rekha sharma	46	F	409943	Whole body package	18/04/2013	9:00
93	deshraj sharma	55	M	306179	Comprehesive package	18/04/2013	9:15
94	bipin kumar pathak	40	M		Whole body package	18/04/2013	9:25
95	akhlesh srivastava	49	M	410158	Whole body package	18/04/2013	9:45
96	ankush rattan	34	M	156075	Religare executive	18/04/2013	10:00
97	sharma y k	63	M	260836	Whole body package	18/04/2013	10:10
98	panna lal ash	52	M	408545	Gail india executive	19/04/2013	9:00
99	pratyush ranjan	29	M	327459	L & T executive	19/04/2013	9:15
100	vishal kumar	39	M	408571	Indus towers executive	19/04/2013	9:25
101	rajshree kumar	39	F	408565	Indus towers executive	19/04/2013	9:45
102	kundan bhardwaj	65	M	410408	Whole body package	19/04/2013	10:00
103	manav bhardwaj	34	M	331700	Whole body package	19/04/2013	10:10
104	shailesh kumar jha	42	M	251792	CGHS executive	20/04/2013	9:30
105	kanwal narang	56	M	360740	NTPC executive	20/04/2013	9:45
106	rama narang	53	F	410546	NTPC executive	20/04/2013	10:00
108	subarno ghosh	23	M	410548	Honda siel package 2	20/04/2013	10:15
109	rishi kant sharma	31	M	408561	Shriram pistons executive	20/04/2013	10:25
110	ashish sharma	31	M	408564	Shriram pistons executive	20/04/2013	10:40
111	kunti verma	37	F	410168	LG executive	22/04/2013	9:00
112	ram chandra	42	M	410169	LG executive	22/04/2013	9:20
113	praveen sharma	51	M	410160	CGHS executive	22/04/2013	9:35
114	shailendra kumar verma	47	M	410756	CGHS executive	22/04/2013	9:45
115	kamal kant kamal	43	M	410787	Shriram pistons executive	22/04/2013	10:00
116	saurav verma	26	M	407318	Tata mcgraw hill executive	1/4/2013	9:00
117	manas mrinal	23	M	407319	Tata mcgraw hill executive	1/4/2013	9:15
118	neha nigam	36	F	407323	Comprehesive package	1/4/2013	9:30
119	o k khullar	75	M	313316	Fortis 10 years package	1/4/2013	9:50
200	b d roy	63	M	201	Fortis 10 years package	1/4/2013	10:10
221	urmila roy	62	F	200	Fortis 10 years package	1/4/2013	10:25
222	mohan lal	45	M	407291	CGHS executive	2/4/2013	9:30
223	c p s bakshi	46	M	407289	CGHS executive	2/4/2013	9:45

224	anita gupta	44	F	345050	NTPC executive	8/4/2013	9:10
225	dhirendra singh	24	M	349253	Dorling kindersley pre	8/4/2013	9:20
226	shashi prabha	62	F	408033	Fortis 10 years package	8/4/2013	9:30
227	satish kumar	63	M	408034	Fortis 10 years package	8/4/2013	9:45
228	shashi bhushan chaurasia	39	M	134997	Whole body package	8/4/2013	10:00
229	limatula yaden	44	F	88365	CGHS executive	9/4/2013	9:00
230	brajesh kumar	25	M	409074	Oberthur package	9/4/2013	9:15
231	basant lal	53	M	142438	NTPC executive	9/4/2013	9:25
232	shripal gangwar	56	M	253889	Whole body package	9/4/2013	9:35
233	hemant yadav	23	M	409078	Oberthur package	9/4/2013	9:55
234	ashok chauhan	48	M	250249	NTPC executive	9/4/2013	10:15
235	manish dublish	40	M	177383	Alstrom T & D executive	10/4/2013	9:00
236	dinesh mehrotra	58	M	408850	CGHS executive	10/4/2013	9:15
237	ankit pahuja	31	M	409220	Comprehesive package	10/4/2013	9:25
238	p subramanian	49	M	337569	CGHS executive	10/4/2013	9:35
239	sohail zaidi	29	M	409213	Deluxe package	10/4/2013	9:50
240	aswani rathore	29	M	408586	Startrack executive	10/4/2013	10:00
241	shubham jairath	34	M	409217	Religare executive	10/4/2013	10:10
242	partha sarathi bagchi	43	M	353314	Shriram pistons executive	11/4/2013	9:30
243	piyaray lal	52	M	409340	Tata mcgraw hill executive	11/4/2013	9:45
244	tulsi devi	70	F	408800	Technip KT executive	11/4/2013	10:00
245	jasjeev singh swani	43	M	305758	Whole body package	11/4/2013	10:15
246	tripat swani	38	F	305759	Whole body package	11/4/2013	10:25
247	usha prasad	71	F	85957	Fortis 10 years package	11/4/2013	10:40
248	sachin sharma	32	M	409441	Oberthur package	12/4/2013	9:30
249	alka rani chaudhary	34	F	105616	Comprehesive package	12/4/2013	9:40
250	avadh kishore jain	61	M	94616	Simon india executive	12/4/2013	9:50
251	arti jain	54	F	94134	Simon india executive	12/4/2013	10:00
252	uttam singh mayal	53	M	408030	Fortis 10 years package	12/4/2013	10:15
253	brajesh kumar	36	M	161408	Religare executive	12/4/2013	10:25
254	sanjay kumar varshney	42	M	71268	CGHS executive	13/04/2013	9:00
255	pankaj kumar singh	48	M	102485	Gail india executive	13/04/2013	9:20
256	anurag srivastava	27	M	313845	Honda siel package 4	13/04/2013	9:30
257	a k nagpal	57	M	335278	RBI executive	13/04/2013	9:50
258	anil dev	52	M	408539	Deluxe package	13/04/2013	10:00
259	ram babu	51	M	408543	Gail india executive	13/04/2013	10:25
260	hemraj	29	M	409790	Tata mcgraw hill executive	15/04/2013	9:00
261	ashok kumar panda		M	155375	Tata power executive	15/04/2013	9:15
262	rajesh jain	45	M	78837	Whole body package	15/04/2013	9:25
263	satish jain	56	M	409782	Whole body package	15/04/2013	9:35
264	virendra dutt bhagat	35	M	409781	LG executive	15/04/2013	9:50
265	yogendra kumar	29	M	409801	Ansaldo executive	15/04/2013	10:00
					Basic comprehensive		

266	dhoop singh	60	M	396546	Basic comprehensive package	16/04/2013	9:30
267	srishti santosh sonkar	26	F	327190	NTPC executive	16/04/2013	9:45
268	panoose t t	52	M	231855	Fortis 10 years package	16/04/2013	10:00
269	vikas sharma	27	M	310522	Religare executive	16/04/2013	10:15
270	dinesh kumar	33	M	261673	Alstrom T & D executive	16/04/2013	10:25
271	lallan kumar	44	M	409951	CGHS executive	16/04/2013	10:35
272	shruti dhand	33	F	409580	Religare executive	17/04/2013	9:00
273	sandeep bachhas	27	M	409591	Religare executive	17/04/2013	9:20
274	susmit saraswat	24	M	409745	Religare executive	17/04/2013	9:35
275	sunil mishra	51	M	410164	Tata mcgraw hill executive	17/04/2013	9:45
276	dharam pal	57	M	410165	Tata mcgraw hill executive	17/04/2013	10:00
277	srishti gupta	24	F	409747	Religare executive	17/04/2013	10:20
278	chitra rekha sharma	46	F	409943	Whole body package	18/04/2013	9:00
279	deshraj sharma	55	M	306179	Comprehesive package	18/04/2013	9:15
280	bipin kumar pathak	40	M		Whole body package	18/04/2013	9:25
281	akhlesh srivastava	49	M	410158	Whole body package	18/04/2013	9:45
282	ankush rattan	34	M	156075	Religare executive	18/04/2013	10:00
283	sharma y k	63	M	260836	Whole body package	18/04/2013	10:10
284	panna lal ash	52	M	408545	Gail india executive	19/04/2013	9:00
285	pratyush ranjan	29	M	327459	L & T executive	19/04/2013	9:15
286	vishal kumar	39	M	408571	Indus towers executive	19/04/2013	9:25
287	rajshree kumar	39	F	408565	Indus towers executive	19/04/2013	9:45
288	kundan bhardwaj	65	M	410408	Whole body package	19/04/2013	10:00
289	manav bhardwaj	34	M	331700	Whole body package	19/04/2013	10:10
290	shailesh kumar jha	42	M	251792	CGHS executive	20/04/2013	9:30
291	kanwal narang	56	M	360740	NTPC executive	20/04/2013	9:45
292	rama narang	53	F	410546	NTPC executive	20/04/2013	10:00
293	subarno ghosh	23	M	410548	Honda siel package 2	20/04/2013	10:15
294	rishi kant sharma	31	M	408561	Shriram pistons executive	20/04/2013	10:25
295	ashish sharma	31	M	408564	Shriram pistons executive	20/04/2013	10:40
296	kunti verma	37	F	410168	LG executive	22/04/2013	9:00
297	ram chandra	42	M	410169	LG executive	22/04/2013	9:20
298	praveen sharma	51	M	410160	CGHS executive	22/04/2013	9:35
299	shailendra kumar verma	47	M	410756	CGHS executive	22/04/2013	9:45
300	kamal kant kamal	43	M	410787	Shriram pistons executive	22/04/2013	10:00
301	ashwin elangovan	27	M	374080	Whole body package	22/04/2013	10:20
						23/04/2013	
302	dinesh singh bhandari	46	M	2215	Gail india executive	23/04/2013	9:00
303	kamal nayan srivastava	24	M	411104	Multibis financial services pre	23/04/2013	9:30

304	manoj kumar	27	M	411108	Carbon continental pre	23/04/2013
305	lalit kapoor	46	M	410417	Whole body package	23/04/2013
306	jogindera mitra	37	M	411106	Deluxe package	23/04/2013
307	vishal bansal	40	M	197670	LG executive	23/04/2013
308	sumita bhaduri	46	F	407017	Rites executive	24/04/2013
309	sanjeev kumar	44	M	25808	IOCL executive	24/04/2013
310	sudhir kumar	50	M	410415	CGHS executive	24/04/2013
311	deepak singh bora	38	M	328327	Deluxe package	24/04/2013
312	sudhir kumar	50	M	410415	CGHS executive	24/04/2013
313	ruchi agarwal	44	F	410416	CGHS executive	24/04/2013
315	sushil prasad	52	M	304104	CGHS executive	25/04/2013
316	rajasree k menon	41	F	381080	Whole body package	25/04/2013
317	sarita jha	37	F	339	Gail india executive	25/04/2013
318	nitin seth	28	M	411480	Religare executive	25/04/2013
319	deepak bhasin	36	M	409948	Religare executive	25/04/2013
320	anand singh	36	M	409947	Religare executive	25/04/2013
321	manpreet singh brar	30	M	197429	Religare executive	26/04/2013
322	mohinder singh	58	M	344104	Religare executive	26/04/2013
323	rajnish kashyap	29	M	411635	Dorling kindersley executive	26/04/2013
324	kingshuk ghoshal	29	M	411636	Dorling kindersley executive	26/04/2013
325	sushil kumar	34	M	232834	Alstrom T & D executive	26/04/2013
326	m usha rani	50	F	410793	Whole body package	26/04/2013
327	trinder pal singh	57	M	410759	Deluxe package	27/04/2013
328	neelam agarwal	31	F	410559	Safenet executive	27/04/2013
329	sunita bansal	49	F	410547	Deluxe package	27/04/2013
330	yashpal singh	46	M	411760	Whole body package	27/04/2013
331	fuad sulieman thulthi	63	M	411768	Deluxe package	27/04/2013
332	vivek shukla	39	M	411900	Technip KT executive	28/04/2013
333	s john mahesh	42	M	411906	Technip KT executive	28/04/2013
334	prabhat kumar khan	40	M	411904	Technip KT executive	28/04/2013
335	s marthanda pillai	45	M	411905	Technip KT executive	28/04/2013
336	mukesh kantilal	49	M	411903	Technip KT executive	28/04/2013
337	ganesh n s	44	M	403499	Technip KT executive	28/04/2013
338	gaurav gupta	28	M	410424	Whole body package	29/04/2013
339	meena	37	F	410561	Yamaha motors executive	29/04/2013
340	gollapudi ramamurthy	42	M	411955	Delphi automotive pre	29/04/2013
341	reetu pandey	26	F	411944	Dorling kindersley pre	29/04/2013
342	paramjeet kaur bedi	51	F	410760	Deluxe package	29/04/2013

341	reetu pandey	26	F	411944	Dorling kindersley pre	29/04/20
342	paramjeet kaur bedi	51	F	410760	Deluxe package	29/04/20
343	sourabh kanugoe	35	M	411952	Tata mcgraw hill executive	29/04/20
344	sanchita panda	41	F	411500	Tata power executive	30/04/20
345	shudhakar dam	25	M	412093	British council pre	30/04/20
346	anju tripathi	36	F	411230	Whole body package	30/04/20
347	mukund Sharma	34	M	411232	Deluxe package	30/04/20

Out of 15 patients in a day only six patients has been taken as sample size.

-So, total number of patient in a month 347.

-Average waiting time for one patient

-45 minutes has been observed as average waiting time for per patients in USG.

-130 minutes has been observed as average waiting time for e patient in Mammography.

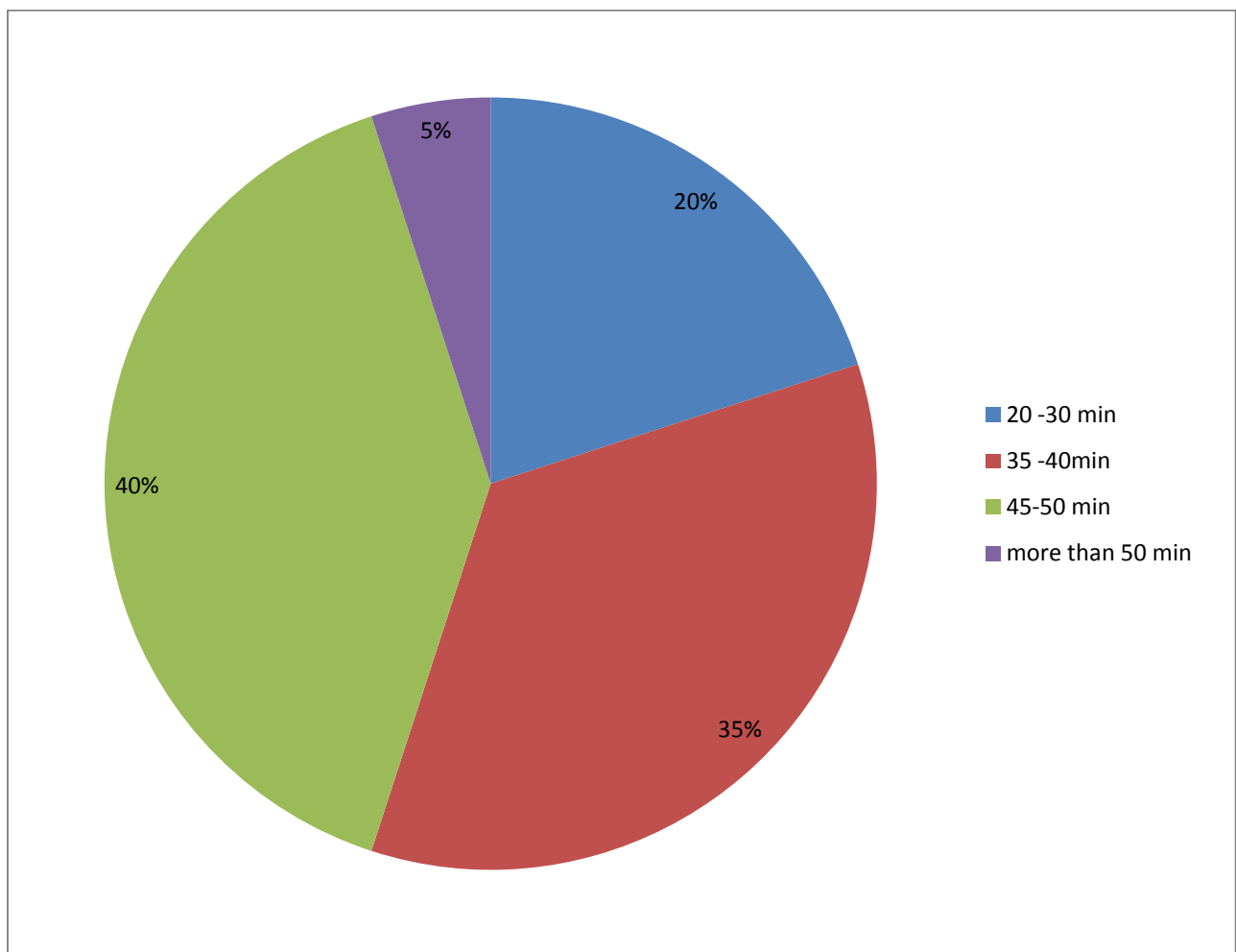
-20 minutes has been observed as average waiting time for X-ray.

-2:30 minutes has been observed as average waiting time for MRI.

According to study ultrasound is the bottleneck of radiology.

TIME TAKEN IN ULTRASOUND:-

45 minutes has been observed as average waiting time for per patients in USG.



PROBLEMS

- 1) It was observed that clients don't understand what is meant by full bladder. They ask question like how much water should I drink? How much time will it take to get the USG done? How much time should I wait?
- 2) Whenever there is an OPD and IPD ultrasound appointment simultaneously health check patient are made to wait ,due to less no of ultrasound machine and Doctors.
- 3) There is no proper time scheduling for nurses & doctors.
- 4) It has been observed that sometime USG machines are not working properly in day time,it creates problems and enhance the waiting time.

SUGGESTION:-

-On the front desk and on the billing counter who ever employee is appointed, he /she should be from medical background or should be familiar by medical terminology and medicine.

-There should be appointing a person for queue inspection to manage the queue properly and should check every person requirement for billing, standing in queue.

-Limited appointment or buy a new machine with increased man power.

-Proper time scheduling for nurses and doctors.

-Proper training program for doctors and nurses to handle new machines in the radiology department.

-Dedicate the machine for the PHC department.

-Different colour paper for health check up patients so that everyone can able to identify the PHC patients without asking.

- Provide newspaper or magazines in radiology patient waiting area so that patients may engage .

- Call patient in morning between 8:00 to 8:30 start the test with blood sample then TMT and after that ultra or vise versa in this way patient can able to take breakfast at time and other test may also done in turn around time. Because these two test are time taking test and also need fasting.

- The radiology machinery should be check on daily basis ,after the working hours by te