"Study of the CT Scan Facility in a remote District Hospital"

A Dissertation submitted in partial fulfillment of the requirement

for the award of

Post Graduate Diploma in Health and Hospital Management

by

Manoj Joshi

Roll No. PG/08/026



International Institute of Health Management Research

New Delhi- 110075

May, 2010

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This is to certify that Mr. /Ms. /Dr. has successfully completed his 3 months internship in our organization from February 1, 2010 to April 30, 2010. During this intern he has worked on ……. (ISO Certification) under the guidance of me and my team at ……(ICRA Management and Consulting Services (IMaCS)). ……. (any positive/negative comment)

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Certificate of Approval

The following dissertation titled **"Study of the CT Scan Facility in a remote District Hospital"** is hereby approved as a certified study in management carried out and presented in a manner satisfactory to warrant its acceptance as a prerequisite for the award of **Post-Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

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Certificate from Dissertation Advisory Committee

This is to certify that **Mr. /Ms. Manoj Joshi,** a participant of the **Post- Graduate Diploma in Health and Hospital Management**, has worked under our guidance and supervision. He/ She is submitting this dissertation titled **"Study of the CT Scan Facility in a remote District Hospital"** in partial fulfillment of the requirements for the award of the **Post-Graduate Diploma in Health and Hospital Management**.

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

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Abstract

"Study of the CT Scan Facility in a remote District Hospital"

The purpose of this research is to study the PPP model of CT Scan facilities in a remote district hospital. The study is undertaken basically to understand the process followed, scope of services, identifying the various systems which are placed for the delivery of health services. This research used Satisfaction survey amongst service provider and service recipients, systematic observation, process chart, and time –motion study as research methodology .The data was collected and analyzed using statistical tools to come to a conclusion and then was used for improvement of work process was executed by eliminating and combining of work processes, which reduces the extra time and number of processes and hence streamlining of CT Scan services in the hospital.

Key Words: District Hospital, CT Scan, Public Private Partnership (PPP), Surveys, Time Motion Study, Flow Process Chart.

Acknowledgement

I deem it a sacred duty to thank all those who helped me in the completion of this project. It is an esteemed pleasure to present this project, and we whole heartedly thank each and every one who helped us in this task.

I am grateful to **Dr. (Col) Sajal Sen,** , our organization advisor, **Assistant General Manager & Programme Leader- Healthcare ICRA Management & Consulting Services Limited (IMaCS), NOIDA** for his invigorating help everywhere within this task. His constructive criticism and reviving ideas were extremely precious and helpful during the venture. I am obliged to him for providing me with the facilities to carry forward the study.

I also take the opportunity to thank **Surgeon Rear Admiral (Retd.) Dr V.K.Singh**, Director, IIHMR, New Delhi, and **Dr Nitish Dogra**, Assistant Professor, IIHMR for giving me this opportunity to work under his supervision.

I am thankful to **Dr Samshudoha (Civil Surgeon Cum Medical Suprintendent), Ms. Priyanka James (Hospital Consultant), Mr. Sahu (CT Scan Technician), Raghunath District Hospital Ambikapur, Chhattisgarh** for briefing me well with the administrative maneuvers and for always inspiring and elevating me to explore the realms of knowledge in all spheres of management

I would like to articulate my regards to the **entire staff at Raghunath District Hospital Ambikapur, Chhattisgarh** for being answerable to my uncertainties and providing me with all the required details.

Last but not the least; I honored to have the privilege to thank my family for their unparalleled love and for providing me all the opportunities and amenities I untimely desired for.Above all, I am gratified to God, for the strength, confidence and everything I have today.

Manoj Joshi

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ABBREVIATIONS

CT - Computerized Tomography

ISO- International Organization for Standardization.

PPP- Public Private Partnership.

OPD- Out Patient department

INR- Indian Rupee.

FPC- Flow Process Chart.

CAMC- Comprehensive Annual Maintenance Contract

Part I

Internship Report

The Internship period of mine was started from February 1 to May 1, 2010. The Internship started from ICRA Management and Consulting Services (IMaCS), NOIDA, were I was designated the position of ISO Consultant in Raghunath District Hospital, Ambikapur, Chhattisgarh and Community Health Centre, Manendragarh. The project is of NHSRC on Quality Improvement in Public Health Facilities. The mentor for my Internship was **Dr. (Col) Sajal Sen,** , our organization advisor, **Assistant General Manager & Programme Leader- Healthcare ICRA Management & Consulting Services Limited (IMaCS), NOIDA**

IMaCS - an introduction

ICRA Management Consulting Services Limited (IMaCS) is a multi-line management/development consulting firm headquartered in India. IMaCS have an established track record of 15 years in consulting and a diversified client base across various sectors and countries. IMaCS has completed over 900 consulting assignments and has worked in over 35 countries across the globe.

ICRA Management Consulting Services Limited (IMaCS) is a fully- owned subsidiary of ICRA Limited (ICRA), one of India's leading credit rating agencies. IMaCS operated as a division of ICRA till March 2005, when it was de-merged from ICRA and became a standalone company. Our clientele includes multilateral and bilateral agencies, banks & financial institutions, manufacturing and service organisations, Governments, Government-owned organisations, investors, and regulators.

About Group ICRA

Launched in 1991 in India, ICRA has been set up by a number of prominent Indian financial institutions, banks, and insurance companies. In September 2001, Moody's Investment Company India (Private) Limited, a 100% subsidiary of Moody's Investors Service, USA, became the single largest shareholder in ICRA. Group ICRA comprises three businesses: Credit Rating, Management Consulting and IT/BPO services, offered by four different companies comprising ICRA and its three subsidiaries, namely, IMaCS, ICRA Techno

Analytics Ltd. (ICTEAS) and ICRA Online Limited. ICRA is listed on the National Stock Exchange and the Bombay Stock Exchange in Mumbai, India.

ICRA clientele includes banks, financial institutions, non-banking financial companies, manufacturing and services organizations, governments, government-owned organizations, debt and equity investors, regulators, and multilateral agencies. ICRA has executed assignments for multilateral agencies such as The World Bank, World Bank Institute (WBI), Commonwealth Development Corporation (CDC), United Nations Development Programme (UNDP), United States Agency for International Development (USAID), Department for International Development (DfID), African Development Bank (AfDB), Asian Development Bank (ADB) and International Finance Corporation (IFC).

IMaCS Business Groups and Practice Areas

The different business groups and practice areas within IMaCS form our matrix of service offerings. Multi-disciplinary teams are used on most assignments. The diversity of experience in IMaCS teams helps it to adopt a creative and cross-functional approach to problem solving, which has not only been very successful in practice, but has also been well appreciated by all our clients.

Most consultants at IMaCS have advanced academic degree in various disciplines and many have gained experience in reputed firms prior to coming to IMaCS. Both freshers and experienced consultants undergo formal and informal training in IMaCS to deliver high quality and implementable solutions to clients. IMaCS' clients also have the benefit of the considerable organisational expertise that IMaCS has built up over the past ten years.

Below is the brief executive summary of the Roles & Responsibilities of mine during my Internship:

The capacity building of select health care facilities in Ambikapur and Manendragarh, Chhattisgarh. It includes:

- Mapping the As-Is Process
- Identifying the resource and process gaps

Mapping the As-Is Process

1) The As-Is Analysis has used Donabedian's Framework of assessment (1) and has evaluated the current facilities/processes against the standards of IPHS, ISO 9001-2000 guidelines and other relevant standards available in various literature. The method of AS-IS mapping at the District Hospital Ambikapur includes the following:

(a) Observation of the processes and the facility
(b) Study of the documents available at the departments
(c) Data collection from the hospital records, patients & staff (survey)
(d) Discussion with department heads/in-charges of hospital areas
(e) Comparison of the observations with various standards like IPHS, ISO and relevant standard literature/text books.

2) All the data collected by the above tools, has been collated and analyzed to offer a comparative format for efficient gap identification.

Facility Utilization: Key Findings

1) The hospital has witnessed a downward trend in the OPD utilization. There has been about 30% decrease in the number of OPD consultations in the last 1-2 years. *(OPD 136569 in 2003: in 2008 total OPD 185505 and in current year 2009 total OPD was 134466)*

2) The IPD utilization has shown increasing trend with marginal increase of CAGR 8.19% in comparison to base year 2003. *(Total IPD 15280 in 2003 and in year 2009 total IPD 28693.)*

3) The hospital has also witnessed an increase in the patients visiting the emergency department. The hospital's emergency visits has increased with a CAGR of 24.38 % from 2005-06 (Total Emergency attendance 5468) to 2009-10. (Total Emergency attendance 16274) (Data for period prior to 2005 could not be traced.)

4) The number of major surgeries has increased with a CAGR of 2.94 %. However there is a trend fluctuation in case of surgical work load. In 2003 the total major surgeries carried out were 979. Thereafter there was a gradual decline to just 387 Major surgeries in 2005-2006. By the year 2007 it again rose to 2486 Major surgeries conducted in the hospital. In the year 2008 and 2009 the figures are again declining to 1672 and 1234 respectively.

5) Similar fluctuation is also seen in the minor surgery work load as well.

6) The number of normal deliveries has increased with a CAGR of 19.71% and caesarian has increased with a CAGR of 10.95 % from 2002-03 to 2009-10. The total number of deliveries conducted in the year 2003 was 631. In the year 2009 the total number of deliveries conducted in the hospital was 3476 out of which the Caesarian section was 40%. The JSY beneficiaries have increased by almost ten folds since year 2007 wherein the figures have risen from 346 in 2007 -2008 to 3496 in the year 2008-2009. The latest figures for 2009-20010 are 3088 as on Jan 2010.

Identifying the resource and process gaps

The GAP Analysis

1) The various Gaps identified have been classified either as resource/infrastructure Gap or process Gap and depending upon their implications on the patient care they have been further classified as High Medium and Low. The details of the Gaps along with rationale and impact have been recorded in the subsequent section of the report. The major Gaps are briefly highlighted in the subsequent paragraphs.

Infrastructure Gaps noticed in Casualty

1) The casualty was located inside the OPD complex and approach to casualty was common with main entrance. The patients had to wheel in patients in a circuitous route. These aspects have been overcome by commissioning of the new casualty block with a dedicated entrance and sufficient covered space for off loading the patients. As such most of the infrastructural gaps of the erstwhile casualty have been closed

Process Gaps Noticed in Casualty

1) It was observed that the drugs in the casualty were not stocked in a manner to facilitate easy retrieval and identification. Similarly sounding and similarly appearing drugs were stocked together which could be hazardous in emergency situation.

2) Further it was noticed that there was no clear evidence of disinfection of beds and equipment periodically although it was stated to have been carried out periodically.

3) The casualty does not have standard protocols for the information of staff to deal with common emergency situations. Similarly there is no disaster management plan to deal with mass casualty situation.

4) The Ambulance is not equipped with life support equipment and supplies. Further the charges for availing ambulance services are not displayed anywhere.

Infrastructure/Resource Gap in OPD

1) The OPD lacks in provision of amenities for the patients in the form of safe drinking water facility and toilet facility. It was observed that the drinking water facility is not in working condition. Also there is only one toilet common for male as well as female patients which are under insanitary condition. In the Gynecology OPD also there is no integrated toilet causing inconvenience to the woman patients who need to evacuate bladder prior to internal examination.

2) The list of Doctors available on duty in OPD is not displayed with their room/cabin numbers. The patients who are desirous to get themselves reviewed from the same Doctor who had seen them earlier have to face inconvenience in locating them.

3) There is overcrowding in and around the OPD chambers as there is no audiovisual patient calling system and all patients crown into the chamber in apprehension of missing out their turn. There was no major process gap observed in the OPD.

Infrastructure/Resource Gap in the Inpatient Department

1) The ward complex is planned on Nightingale pattern having series of beds at right angles to the side walls. However the illumination levels at the nurses station were found to be much lower than desired levels prescribed in BIS standards when measured with a lux meter. It was also noticed that there was no nurse calling system in the wards for the beds in which lying/ post operative patients are kept. This causes inconvenience to patients especially during nights when they do not have a relative/attendant nearby.

2) At multiple location seepage problem was noticed on the walls of the ward which could be source of foul odor and infection.

Process Gaps in the in-patient Department

1) It was seen that there is no existing practice amongst the staff to ensure the consumption of oral medicines correctly by the admitted patients which is left for the patients to take and the compliance to medical advice in the ward could be questionable in this regard.

2) There is no evidence on pest and rodent control in the hospital and rodent nuisance was visible in the wards. The ward is always crowded with visitors and relatives in the absence of well enforced visitor control procedure.

3) The Pre-Anesthesia check-up is carried out in wards and no PA check up form used. Use of PA check form will facilitate record of all the details and safer anaesthesia practice and is considered a prescribed method for PA check up.

4) There is no system for prevention and control of Hospital Associated Infections Standard precautions for safety of staff and prevention of transmission infection are not followed. A Hospital infection control committee has been formed consequent to this study and HIC activities have just started.

Infrastructure/Resource Gaps in Operation Theatre Complex and Labor Room

1) The Theatre Sterile Supply Unit (TSSU) was not planned in accordance with the principles of sterilization. There were multiple autoclaves spread in different user areas of the hospital and no standard system in collection distribution and ascertaining the process efficacy was in place. Consequent to this study a new CSSD has been created in the ground floor close to OT in the lines of principles of sterilization including ETO sterilization and process has been brought under control recently.

2) The Operation Theatre is not planned in accordance with zone plan i.e. Protective Zone, Clean Zone, Sterile Zone and Disposal Zone.

3) In the labor room no screen/separation has been provided between delivery tables compromising privacy of the delivering mother.

4) There is no verification system in practice to ensure and evidence appropriate sterility of the operation theatre and labor room. There is no record of fumigation done or conduct of periodic wall swab tests.

5) The empty and filled oxygen cylinders are not appropriately marked. This may cause a stock out at crucial time of need.

Infrastructure/Process Gaps in Laboratory & Radiology

1) The Lab is reasonably equipped to carry out all the routine tests required by the clinicians for treating the patients. However there is no system to verify the correctness of the results by way of cross checking the results with other laboratories or participating in quality control program with some institutes of repute.

2) In the X- Ray department It was observed that though there is a system of using TLD badges the same is not implemented due to absence of films for TLD. And there is no record of TLD reports.

Laundry and Linen Management

1) The hospital has in house laundry where the linen is washed manually. However as per IPHS standard the hospital is required to have a mechanical laundry.

Gaps in Hospital Stores Management

1) It was observed that the consumables like IV fluids and ORS powder are stored in a manner that is not in conformity to the storage instruction on them. They were found to be lying in bulk, exposed to sun light.

2) Different types of medical and other items are not segregated in the store and there is no system in practice for inventory management. There is no display for detection of stock levels of surgical and medical inventory and they are randomly stored on floor and shelves available. Storage area is poorly lit and the illuminations were found to be very in comparison to prescribed BIS norms when measured with lux meter.

Biomedical Waste Management

1) The segregation of hospital waste is not as per rules. The record of waste generated and labeling of the bags is not done by respective ward and departments. There is no conformity to the rules in management of the Kerb site where the waste is temporarily stored after collection from various areas and it was found that potentially hazardous waste is not kept under lock. The waste handlers do not exercise due precautions and personal protective measures. On interaction with different categories of staff significant knowledge gap on the subject was detected amongst the staff in patient care areas and the waste handlers.

Process gaps in Dietary Services

1) It was noticed that the hospital does not have evidence of food safety measures in place while providing dietary services. The cleanliness in the kitchen and food preparation area is not maintained. The food handlers do not undergo regular medical checkup and they do not wear aprons gloves and caps. There is no system in place for regular control of insects, rodents and entry of animals in the kitchen.

Gaps Observed In Medical Records Management

1) It was observed that there is no definite system in place for storage and retention of medical records for easy retrieval. The IPD tickets are put in bundles and stored monthly. The racks and storage cabinets are grossly insufficient in comparison to the quantum of documents.

Gaps Observed In General Management and Hospital Infrastructure

1) The hospital does not have a citizen charter displayed at appropriate location in the hospital premises as prescribed in IPHS.The schedule of available specialists as on day is not displayed in the OPD area of the hospital. In absence of proper information about availability of concerned specialist the patients who come from far away wait in OPD complex in vein.

2) Hospital does not have appropriate safety signage at all required installations like electrical panels, fire exit plans etc.

3) As regards the maintenance and upkeep of the complex there is no annual maintenance plan for the building and fixtures that is required to be maintained by the engineering department. No schedule for preventive maintenance of Fans, ACs Coolers, high output electric fitments and panels, sewage and plumbing lines, overhead tanks, water purifiers etc is being maintained. Most sewage lines are open and chocked in various areas close to IPD and OT complex. The cycle time of repair and maintenance is highly unpredictable.

4) There is no maintenance schedule for Biomedical equipment. A number of Biomedical equipment like Cautery, Operating microscope, suction machines are lying idle for want of maintenance. Further here is no calibration plan for monitoring and measuring equipment.

5) Although water purifiers are installed there is no evidence of its regular cleaning and maintenance. Moreover the area around these water points is also untidy. As such there is no assurance towards quality of drinking water supplied at various water points It was also noticed that the hospital does not have any fire safety plan and there are no fire fighting points with appropriate extinguishers maintained in the hospital premises.

6) There is no plan for continuous training of all cadre of personal in order to enhance their skill sets. The human resources are deficient in comparison to the IPHS norms prescribed for hospital of bed strength 300 beds. There is no evidenced system to capture feedback from the patients. Moreover there is no complaint redressal system in place. There is a complaint box available but it is not used.

Results from Staff and Patient Satisfaction Surveys

1) Survey was conducted to ascertain the satisfaction levels of OPD/IPD patients and the Staff with the help of pre tested set of questionnaire. Each question was required to be responded by the subject in a scale of numerical marking 0 to 5. Accordingly an overall satisfaction index in each category was computed.

(a) As regards the satisfaction survey of OPD patients the overall score was 4.

(b) In the case of Indoor patients the overall score was found to be higher

(c) The overall score of satisfaction survey conducted amongst the staff was found to be 3

2) These indices would be taken as base line and the survey will be repeated after closure of the various Gaps, Staff training and implementation of the quality management system.

Conclusion

District Hospital Ambikapur which is a secondary level health care service provider, centrally located in the District Headquarters has a promising infrastructure in place. All the Gaps identified can be traversed with the help of time bound action plan, training and budgetary support through allocations under existing heads. Upon implementation of Quality Management Systems as per ISO standards the facility will be a role model for the state to emulate.

Part II

Dissertation on

“Study of the CT Scan Facility in a remote District Hospital”

CHAPTER 1
INTRODUCTION

1.1 Background and Purpose of the Study:

The health of a nation is the product of many factors and forces that combine and interact. Economic growth, access to safe drinking water, public and private health care infrastructure, access to preventive health and medical care, the health insurance etc. are among the contributing factors.

The advances in Medical science, biomedical engineering on one side and Information Technology on the other side are offering wide opportunities for improved health care.

Despite making huge strides in overall development, the health coverage to majority of our population is still a distant dream.

India today has more than 1 billion population and there is finite limit of elasticity in providing health care in terms of infrastructure, facility, the manpower and the funds. Wide disparities persist between different income groups, between rural and urban communities, and between different states and even districts within States.

The population is predominantly rural and distributed in distant geographical locations. To provide the basic minimum health care has been one of the priorities of the Health Administration all along.

Further this is compounded by the following factors like:

- High cost of health care and lack of investment for health care in rural areas.
- Inadequate medical facilities in rural & inaccessible areas.
- Problem of retaining doctors in rural areas where they are required to serve & propagate widespread health awareness.
- Specialist doctors cannot be retained at rural areas as they will be professionally isolated and become obsolete and even monetary incentives also cannot prevent it.

The fact on India's health care situation is as follows:

- A recent survey by the Indian Medical society has found 75% of qualified consulting doctors practice in urban centers and 23% in semi urban areas and only 2% from rural areas whereas majority of the patients come from rural areas.
- Hospital beds / 1000 people is 0.19 in rural and 2.2 in urban areas (2).

This calls for innovative methods of healthcare system across the country and PPP model is the best solution for it and our research study is one of the examples of same.

So the purpose of this research is to study the PPP model of CT Scan facilities in a remote district hospital. The study is undertaken basically to understand the process followed, scope of services, identifying the various systems which are placed for the delivery of health services. This research used Satisfaction survey amongst service provider and service recipients, systematic observation, process chart, and time –motion study as research methodology .The data was collected and analyzed using statistical tools to come to a conclusion and then was used for improvement of work process was executed by eliminating and combining of work processes, which reduces the extra time and number of processes and hence streamlining of CT Scan services in the hospital.

1.2 Scope and benefits of the Study

This study concentrates on CT Scan facality in the government hospital.
(ii) The scope of study is the work processes in carrying out the daily functions in CT Scan Department..
(iii) The study focuses on time and flow of work process of pateints from start until the end time of their treatment through CT Scan.
(iv) The data that needs to be carried out is the analyzing of the satisfaction survey, flow chart of the work process, the required time for specific process etc.

The study is chosen because it will benefit to streamline the processes .among the advantages are:

1. Eliminate the Unnecessary

Knowing what is unnecessary is important as knowing what is the most important in process operation. Based on those, we can eliminate insignificant tasks and nonproductive activities. Preoccupation, layout of production, errors, too much motion and travel during performing the tasks are examples of nonproductive activities and it wasted the production time.

2. Simplify the Necessary Operations

Simplify the necessary operations to make the job easier by analyzing the process in order to improve it through elimination, combine or rearrange the sequence and layout of operations. By simplifying the operations, it can also effect for the process time.

1.3 Literature Review

CT was discovered independently by a British engineer named Sir Godfrey Hounsfield and Dr. Alan Cormack. It has become a mainstay for diagnosing medical diseases. For their work, Hounsfield and Cormack were jointly awarded the Nobel Prize in 1979 (3).

CT scanners first began to be installed in 1974. Because of advances in computer technology, CT scanners have vastly improved patient comfort because they are now much faster. These improvements have also led to higher-resolution images, which improve the diagnostic capabilities of the test. For example, the CT scan can show doctors small nodules or tumors, which they cannot see on an x-ray.

CT scans are special x-ray tests that produce cross-sectional images of the body using x-rays and a computer. These images allow the radiologist, a medical doctor who specializes in images of the body, to look at the inside of the body just as you would look at the inside of a loaf of bread by slicing it. This type of special x-ray, in a sense, takes "pictures" of slices of

the body so doctors can look right at the area of interest. CT scans are frequently used to evaluate the brain, neck, spine, chest, abdomen, pelvis, and sinuses.

Usage of CT has increased dramatically over the last two decades. An estimated 72 million scans were performed in the United States in 2007 .

Since its introduction in the 1970s, CT has become an important tool in medical imaging to supplement X-rays and medical ultrasonography. It has more recently begun to also be used for preventive medicine or screening for disease, for example CT colonography for patients with a high risk of colon cancer. A number of institutions offer full-body scans for the general population. However, this is a controversial practice, given its lack of proven benefit, cost, radiation exposure, and the risk of finding 'incidental' abnormalities that may trigger additional investigations.

The greatly increased availability of CT scan, together with its value for an increasing number of conditions, has been responsible for a large rise in popularity. So large has been this rise that, in one of the comprehensive survey it is found that the CT scan utilization rates are highest in the US and Japan, with an estimated 80 scanners per million people in the US versus about 90 scanners/ million people in Japan. The US has over 20,000 installed CT scanners. It is estimated that almost 69 million CT scans were done in the US in 2007. One of the fastest growing applications is CT angiograms, currently at an annual rate of about half a million in the US. Pediatric usage is also growing. An estimated 6 million CT scans per year are done for pediatric cases. Of these, about 600,000 are done for head and abdominal examinations.

But this phenomenal growth is restricted only to the private hospitals or hospitals located in the cities. The rural district hospitals still lack the basic CT scan mechanism, tools, and facilities. As per FICCI study, India needs to add 800,000 beds in the next 10 years. This translates into 350 new hospitals (of 200 bed capacity) to be built every year for the next 10 years. Most of these new hospitals will be created in tier II and tier III cities and towns (4). So there is an urgent need for hospital based radiology practice in these hospitals and hence

CT scan facilities are required. This study aims at assessing the physical facilities, infrastructure and regulatory requirements of installation of CT scan facility in a remote district hospital. It also explores the awareness and exposure regarding the installation, funding and operational aspects of CT scan facility in a remote district hospital. It will focus on the policy, procedure and functional aspects of PPP (Public Private Partnership). The study also provides future recommendations for emerging trends to promote CT scan facilities in remote areas.

Modality	Total installed base in India	(per million polpulation) India	(per million polpulation) China	(per million polpulation) Japan (data as per OECD publications)	(per million polpulation) Korea (data as per OECD publications)
CT	Approx. 3000	3	Approx. 5.5	92.6	31.9

Table 1 :Comparison of CT Scanners in different countries (5)

1.4 CT Scan facility in District Hospital Ambikapur

The hospital has its own CT scan department. The department has facilities for taking CT scan of whole body. The CT Scan department was built up on 12 June, 2004 and the machine is installed on the same day.

The CT scan department is currently looked after by a CT scan technician. There is no radiologist present in the hospital. The CT scan department charges INR 1100 from BPL patients and INR 1600 from general patients.

The CT scan department is an excellent PPP (Public Private Partnership) model. The CT scan department is attached with Nanavati Hospital, Mumbai for diagnosis and reports. Nanavati charges INR 150 for head CT scan and INR 200 for other body parts scan.

.

The machine installed in CT Scan Department is of SIEMENS named SIEMENS SOMATOM CT SCAN SYSTEM and one SIEMENS MAKE KLINOSKOP H/ HELIOPHOIS D, 500 Ma X- RAY MACHINE

SIEMENS is offering SIEMENS REMOTE SERVICES (SRS) to Ambikapur District Hospital at no extra cost.

Salient features of Siemens Remote Services (SRS) are as follows :

1. Higher system availability due to early error detection and offering high UPTIME Warranty. This is one of the key issues to reach high customer satisfaction, loyality and commitment for our best services to valued customers like you.
2. Event monitoring and timely detection of fault, which ultimately leads to to reduce downtime and minimize unscheduled visits.
3. Fast online support and direct access of various services data file by the specialists sitting in Mumbai / Germany at head office support centre.
4. Faster repair with minimized reaction time.
5. Efficient application support and optical usage of CT system offers consistent brilliant images.
6. Understand system usage and suggest optimized resource allocations.

The District Hospital Ambikapur has installed a SIEMENS CT Scan Machine

1.5 Motion Study

According to Ralpha M. Barnes (2001) (6) Frank and Lillian M. Gilbreth are known as the parents of motion study. Gilbreth begin investigation to find the "best way" of performing a given task trough analyzing the motions used by his workmen and he easily saw how to make improvements. He also possessed for analyzing work motion situations to enhance their ability for shorter or less fatiguing motions to improve the work environment. The research included the elimination of all useless motions and the reduction of those remaining motions. The elimination

of this unwanted waste known as work simplification. According Fred (1992), Elton Mayo started their research known as the human relations movement and he discovered that people work better when their attitude is better. He undertook a research project to study what factors affected productivity in the Hawthrone plant. Their studied took place between 1924 and 1933.

1.5.1 Time Study

According to Fred E. Mayers (1992), time study was developed by Frederick W. Taylor in about 1880 which he is the first person to use a stopwatch to study and measure work content with his purpose to define "a fair day's work." He called as Father of Time Study. Among his study is 'Taylor Shoveling Experiment' which he studied between 400 and 600 men that using his own shovel from home to moving material from mountains of coal, coke and iron ore in around two mile-long yards. Taylor identify that there have different size of shovels and he wondered which shovel was the most efficient. Thus, he used a stopwatch and measured everything that workers did. He recorded the data for every work in various ways with varied of shovels size, durations to done their work, number of breaks and work hours. The results were fantastic which it reduced time, saving numbers of workers and budgeting for every year.

1.5.2 Techniques of Motion and Time Study

Motion study has the greatest potential for savings. We can by eliminating the task or combining the task with some task. We can rearrange the elements of work to reduce the work content and we can simplify the operation by moving part. Thus, among the techniques for motion study are :

(i) Process charts
(ii) Flow diagrams
(iii) Operation charts
(iv) Flow process charts
(v) Multiple activity charts (7)

Gilbreths used flow diagrams to show movement of product around an entire plant because they gave an accurate geographical picture of the entire process. They also develop methods study techniques such as cyclograph, chronocyclographs, movie cameras, etc. The techniques of time study start with the last motion technique and it shows the close relationship between motion study and time study. The techniques of time study are:

(i) Stopwatch time study
(ii) Expert opinion standards
(iii) Predetermined time standards
(iv) Work sampling time standards

Frederick W. Taylor used a stopwatch and a clipboard to record the time and findings of his study (Foster, 2003) (8).

Motion and Time study technique can be used widely for variety of research. For example, Ann Hendrich, Marilyn Chow, Boguslaw A. Skierczynski, Zhenqiang Lu (2008) used this techniques to study spend time of nurse at hospital (9). L. Aharonson Daniel (1996) used time studies in A&E department (10). While, Jeffrey S. Smith (2003) survey that many production and manufacturing used simulation as alternative way to develop new effective system.

1.5.3 Relationship and Utilization of Motion and Time Study

Motion and time study helps management determine how much is produced by workers in a specific period of time, therefore making it easier to predict work schedules and output. Motion and Time Study is a scientific method designed by two different people for the same purpose, to increase productivity and reduce time. The two methods evaluate work and try to find ways to improve processes. Frank B. Gilbreth invented motion study designed to determine the best way to complete a job. Frederick W. Taylor designed Time Study; it measures how long it takes a worker to complete a task. Time and Motion Study has become a necessary tool for businesses to be successful today. Time and Motion Study is very important in production control. Now, Offices, Banks, Department Stores, and Hospitals use Motion and Time Study. Offices use it to measure and simplify work in order to reduce costs. Banks use it to help team members reach their sales goals (Foster, 2003).

CHAPTER 2
RESEARCH METHODOLOGY

2.1 Methodology Framework

There are several methods that will be use to achieve research objectives. After the literature review, observation and collecting data is needed. The complete field data collection will be tested before it will be used for data analysis.

The problems and nonproductive in the work process can be identified based on the data collection and their analysis.

Then, the result from the data testing will be determined whether the result can be used or not and if there are any incomplete data, the data collection will be executed again until it fulfills the objective requirement.

2.2 Research Objectives

a) Review Of Records related to CT scan
b) Assessment of utilization and need by interview of stakeholders through pre-tested structured questions.
c) Conduction of satisfaction survey amongst clientele through pre-tested structured questionnaire using Likert Scale.
d) Analysis of various data like diagnostic indicators, utilization pattern, seasonal and periodic utilization if any and equipment downtime and maintenance schedule.
e) Process wise analysis on the basis of Process Flow Chart.

This research was conducted through field study and survey questionnarie . Field study is all the methods of research are made from direct observations towards the live study situations. Researcher collected data by observing and recorded the research subject during the observation. According to Tunnell, 1977, the event from the field study is a matter of real situation in the live condition continuously. The matter is not invent, on design or pause for the research purpose.

2.3 Study Tools

a) Statistical Data analysis and estimates.
b) Time and Motion studies like direct observation using FPC (Flow Process Chart)
c) Structured Questionnaire.

2.4 Basic Procedure for Research

There are four steps to complete this study. There are given below according to their sequence:

(i) Select: select the process or job to be studied.

(ii) Record: observe and record all the relevant facts related to the work process.

(iii) Examine: examine each recorded fact critically

(iv) Develop: develop the most efficient work process.

2.5 Data Collection

This research requires to collect data that are related to the time during the work process occurs, the movement or distance for each process and number of products that they can produces in specific time, which was collect based on several methods:

(i) Pre –questionnaire survey- i.e. Pilot Study on questionnaire-

The Satisfaction survey amongst service provider and service recipients was conducted on scale of 1-5 of their satisfaction levels of availing the services and outlook of the hospital environment, maintenance and sanitation level in hospital.

(ii) **Systematic Observation-**

Systematic observation means researcher are required to observe the whole work process in that industry, then select and focusing on which process or job that want to study. Based on the observation, is needs to record everything happens in each process from the start to finish the work process.

(iii) **Process Chart-**

Process chart is used to show facts as handling, inspection, operations, storage and delays that occur in the work process, where it was happened when the process moves from one process to another process until it finished. Each fact can be represented by symbols, where it is used to describe the process steps.

Process mapping at CT Scan department Ambikapur

Process Group	CT Scan Department	**Process**	Imaging
Process Location	CT Scan department	**Process Owner**	CT Scan Technician
Input(s)	Patient, CT Scan Equipment, CT Scan Staff	**Output(s)**	CT Scan

Process Flow / Process Description	
➢ Patient reaches the CT scan area with the slip. ➢ Patient pays the necessary fee at the OPD counter for the required CT Scan test. ➢ The CT scan technician notes down the details of the patients and the required test is performed. ➢ The CT scan technician instructs the patient to remove the metal objects and puts the part of the body to be exposed to X-ray in the appropriate position and takes X-ray. ➢ Patient is told about the time when the result of the test will be released. ➢ The image is sent to Nanavati Hospital, Mumbai for diagnosis and report making ➢ The image is settled and exposed in a Kodak Ekta Scan 160 Laser imager and dry film is developed. ➢ The developed image along with report from Nanavati hospital is given to patient.	
Process Records	✓ CT Scan department register ✓ Cash slip

Table 2: Process mapping at CT Scan department Ambikapur



Picture1 : Patients availing CT scan facilities in the hospital

(iv) Time and Motion study data.

CHAPTER 3
RESULTS AND FINDINGS

Patient attending each hospital each hospital are responsible for spreading the good image of the hospital and therefore satisfaction of the patients attending the hospital for its services is equally important for the hospital

3.1 Operational Statistics Of Ct Scan

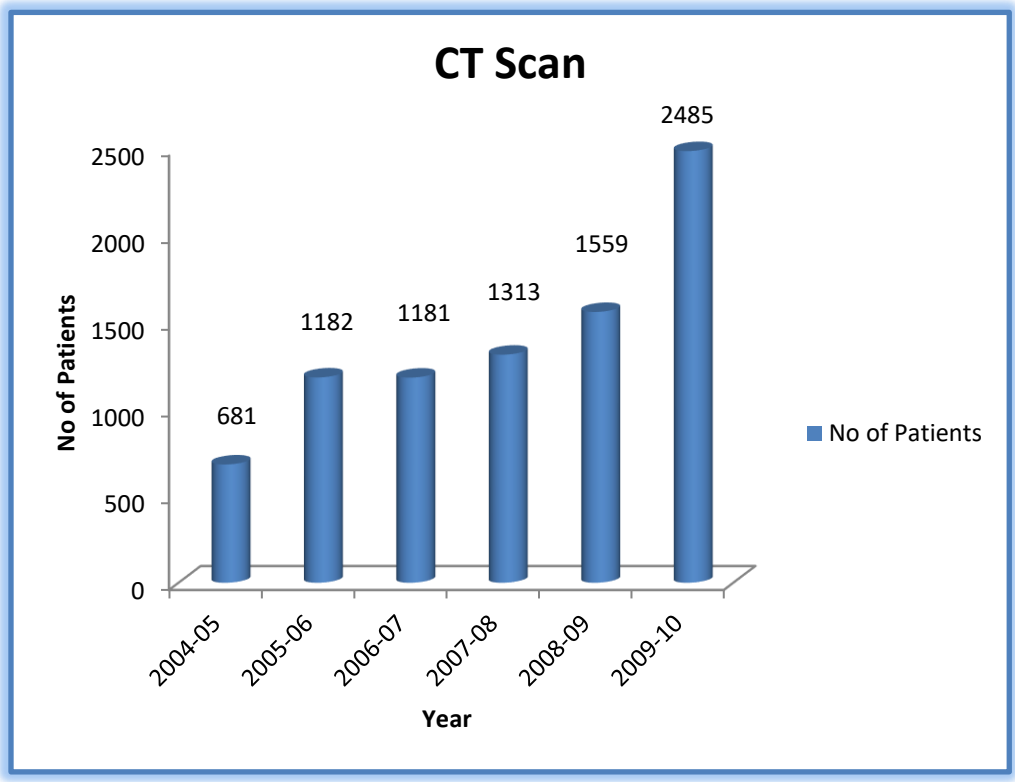


Fig 2 : Number of patients using CT Scan in District Hospital, Ambikapur

Under the CT Scan services, the number of patients taking CT Scan has increased with a CAGR of 24.08 % from 2004-05 to 2009-10. This shows an increasing trend of the service usage. Initially in 2004-05 it was 681 which later increased rapidly into 2485 in 2009-10.

Patient wise data analysis is done by conducting a satisfaction survey:

3.2 Patient Satisfaction Summary

This summary is based on 40 responses between 1 April 2010 and 30 April 2009.

3.2.1 Patient Satisfaction Index

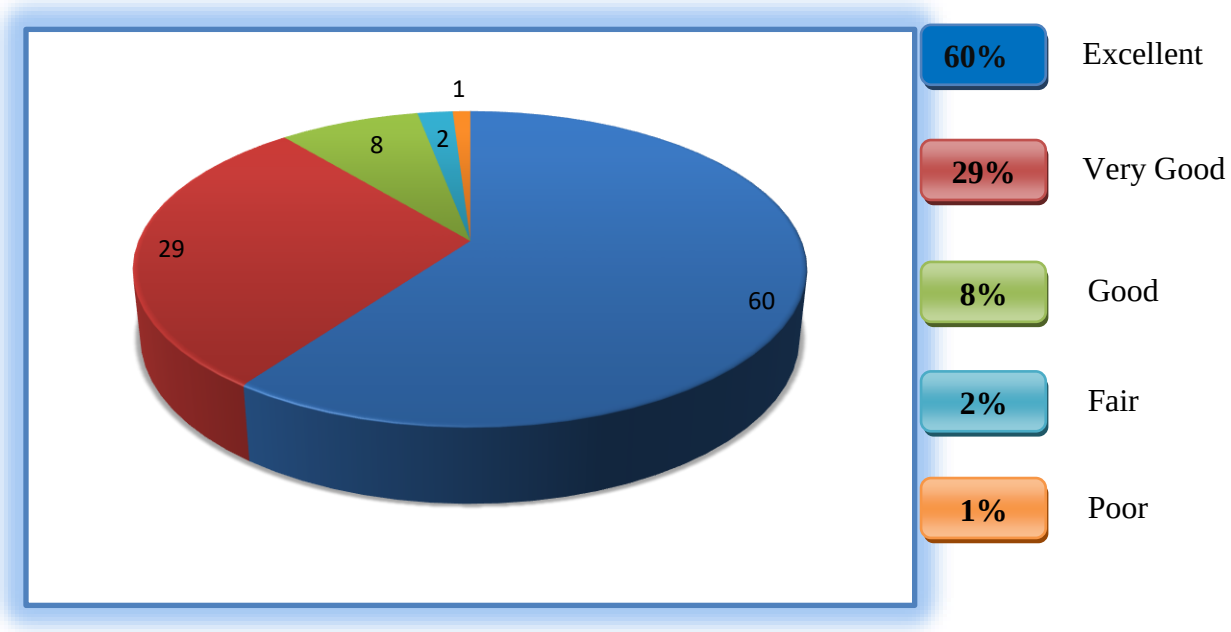


Fig 3: Cumulative overall rating of quality of services from Patient Satisfaction survey

Main points to note – overall results:

1. 97% rated the overall quality of service as ‘good’ or better
2. 88% of patients started their treatment within 15 minutes of their appointment time
3. 98% rated staff as ‘good’ or better
4. 97% rated cleanliness in the facility as ‘good’ or better
5. 94% rated the overall standard of the facility as ‘good’ or better
6. 99% of patients said they were given the time and attention they needed
7. 99% of patients said the procedures were explained in a way they could understand

Chart shows how the question ‘How do you rate the CT Scan Service overall you received’ was answered. Percentages are rounded to the nearest whole number.

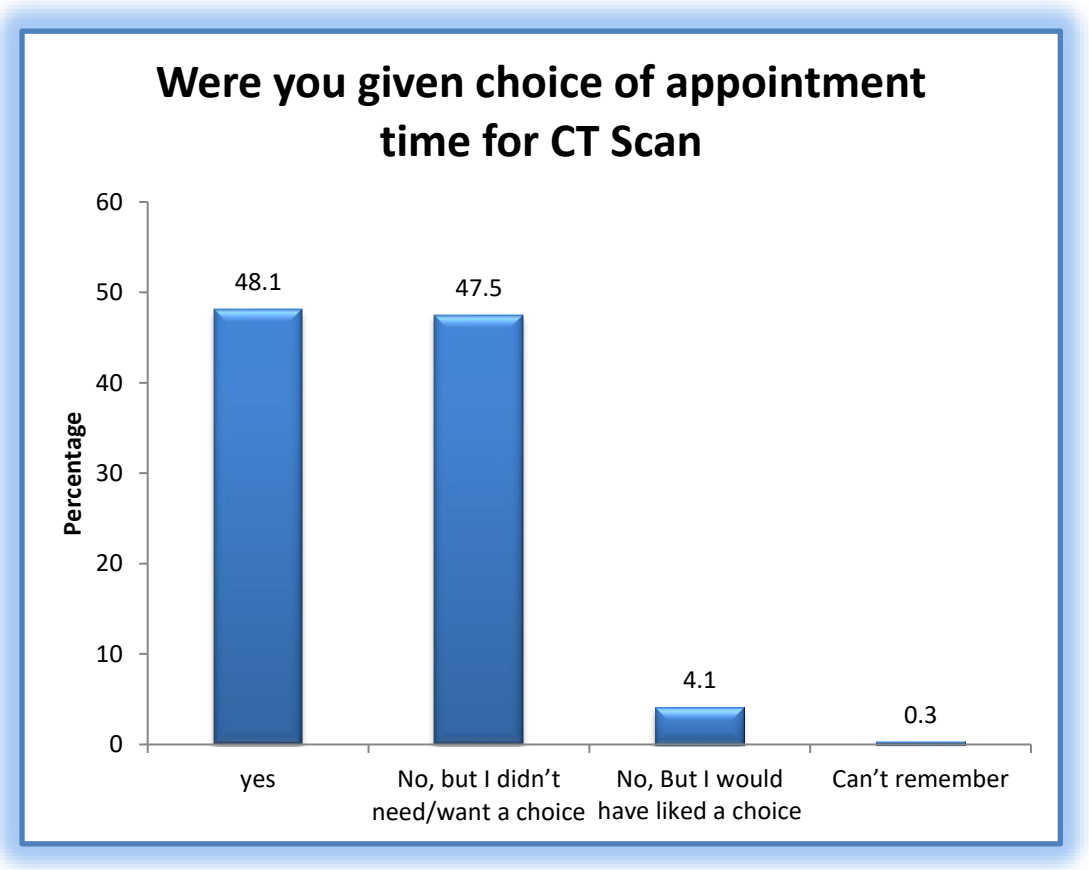


Fig 4: Choice of appointment time for CT Scan

The graph depicts that 48.1 % patients were given choice of appointment time for CT Scan, however 47.5 % didn’t want that choice. 4.1 % says no, but they liked the choice and 0.3 5 says they can’t remember about this.

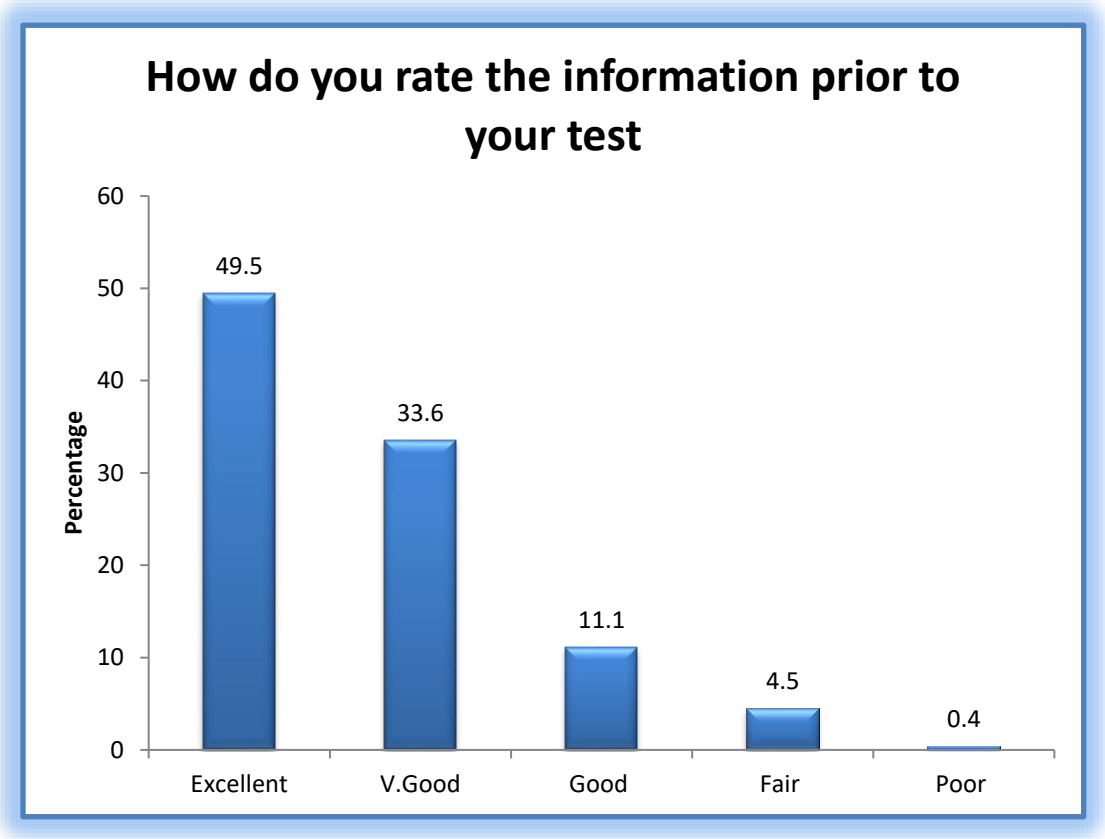


Fig 5 : Information prior to test

The above graph depicts that 49.5 % patients rated the information prior to their test as excellent, while 33.6 % rated very good. 11.1 % rated the information good and 4.5 % and 0.4 % rated it fair and poor respectively.

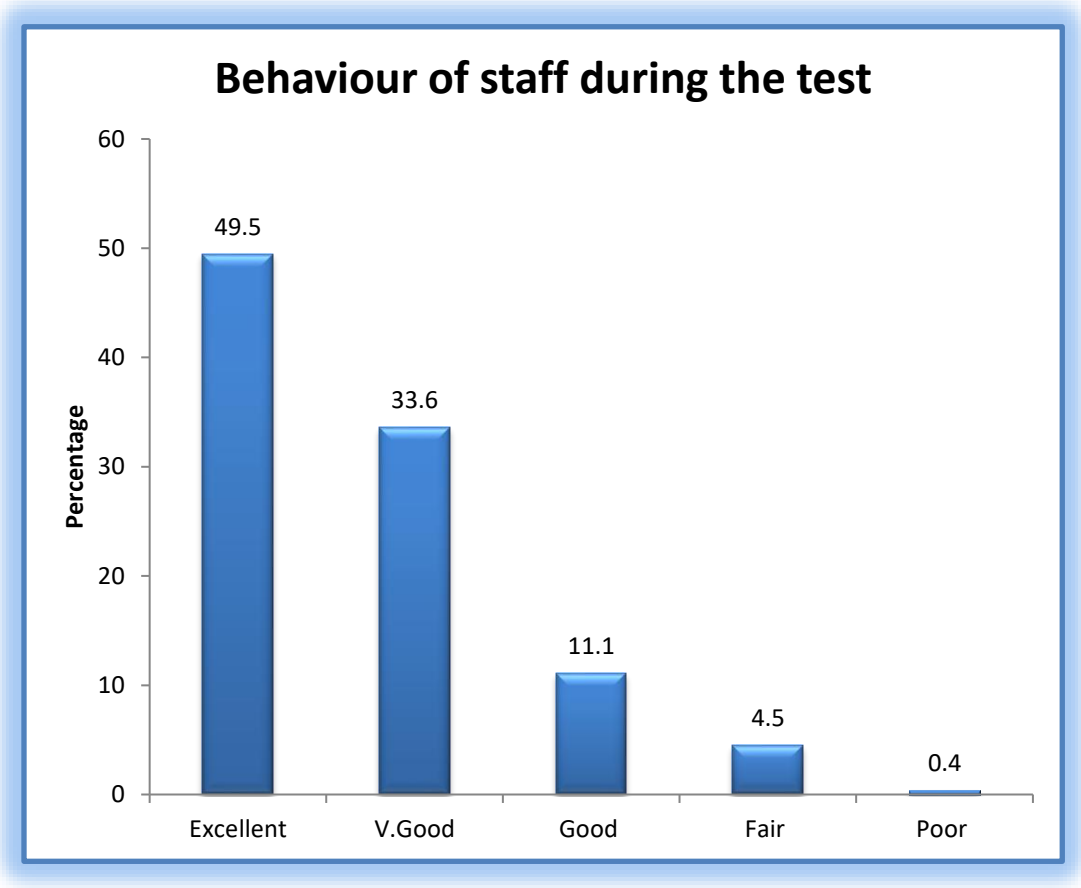


Fig 6: Behavior of Staff during the Test

The above graph depicts that 49.5 % patients says that the behavior of staff during the test was excellent, while 33.6 % says the behavior was very good. 11.1 % says it was good and 4.5 and 0.4 says it was fair and poor respectively.

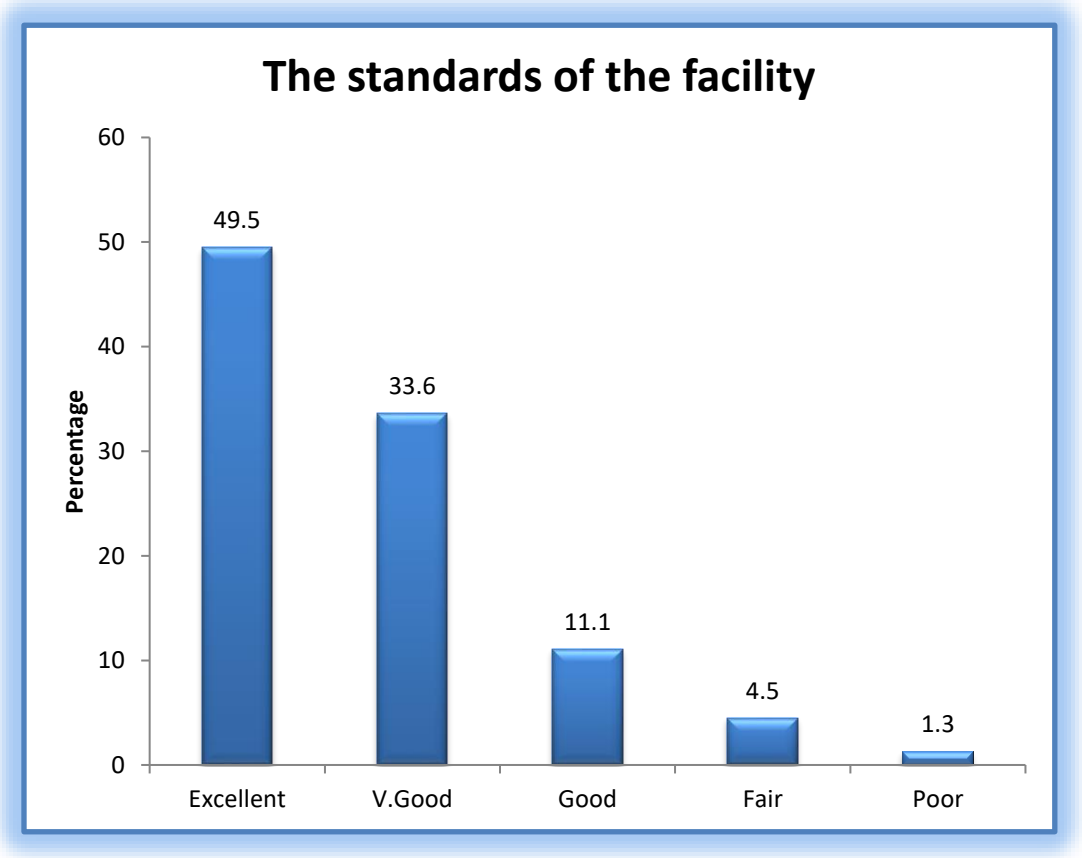


Fig 7 : Standards of facility at CT Scan department

The above graph shows that 49.5 % patients says that the standards of facilities at CT Scan was excellent, 33.6 % says the standards are very good, 11.1 % says the standards are good, 4.5 and 1.3 says the standards are fair and poor respectively.

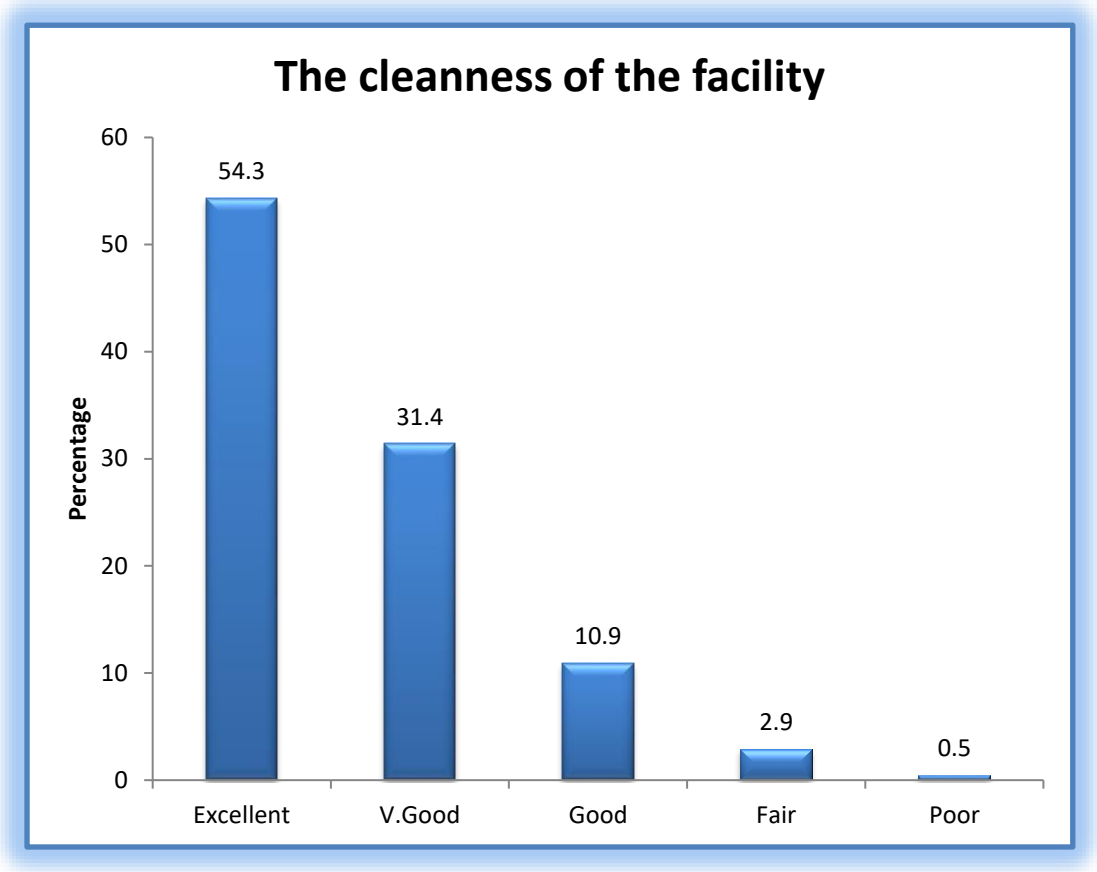


Fig 8: The cleanness of the facility

The graph shows that 54.3 % patients says that the cleanness of the facility was excellent, 31.4 % says the cleanness was very good, 10.9 % says that the cleanness was good while 2.9 and 0.5 % says that it was fair and poor respectively.

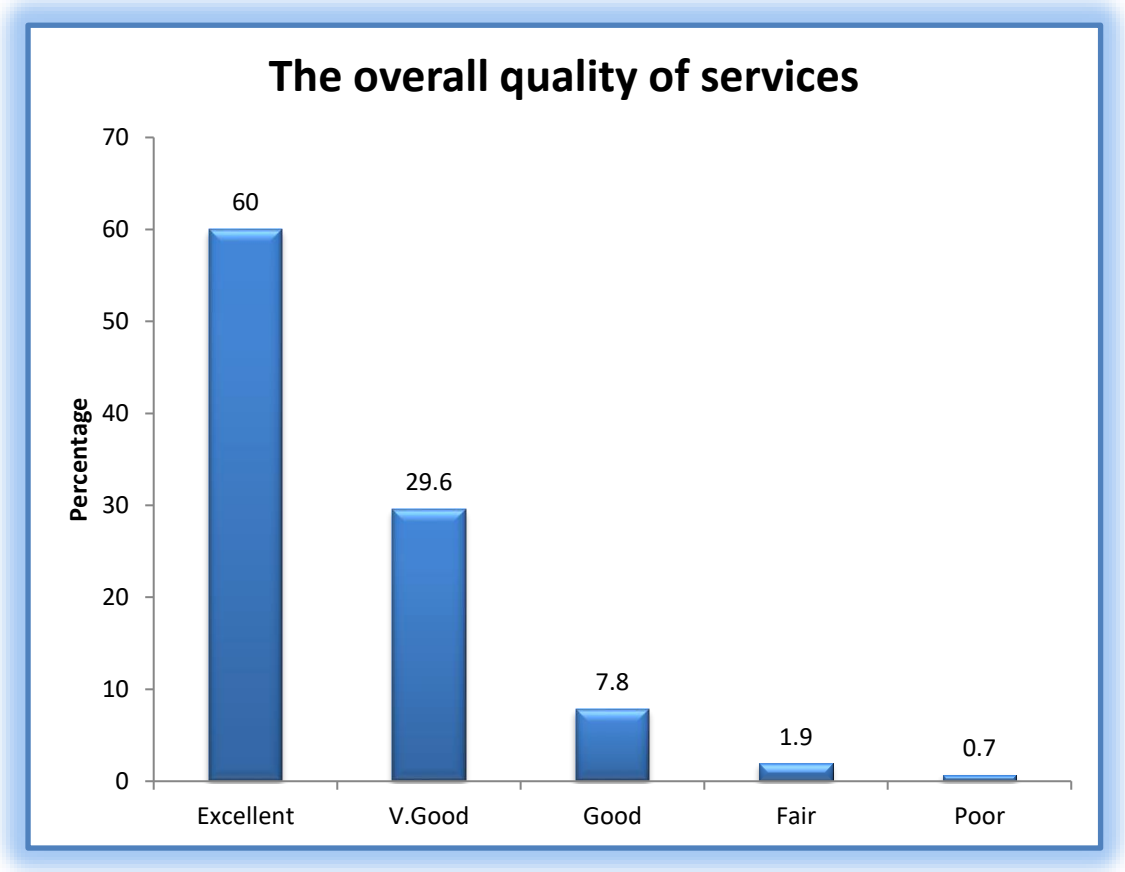


Fig 9: Overall quality of services

In above graph 60 % of patients rated the overall quality of services as excellent one, 29.6 % rated the quality as very good, 7.8 % says good and 1.9 % and 0.7 % says fair and poor respectively.

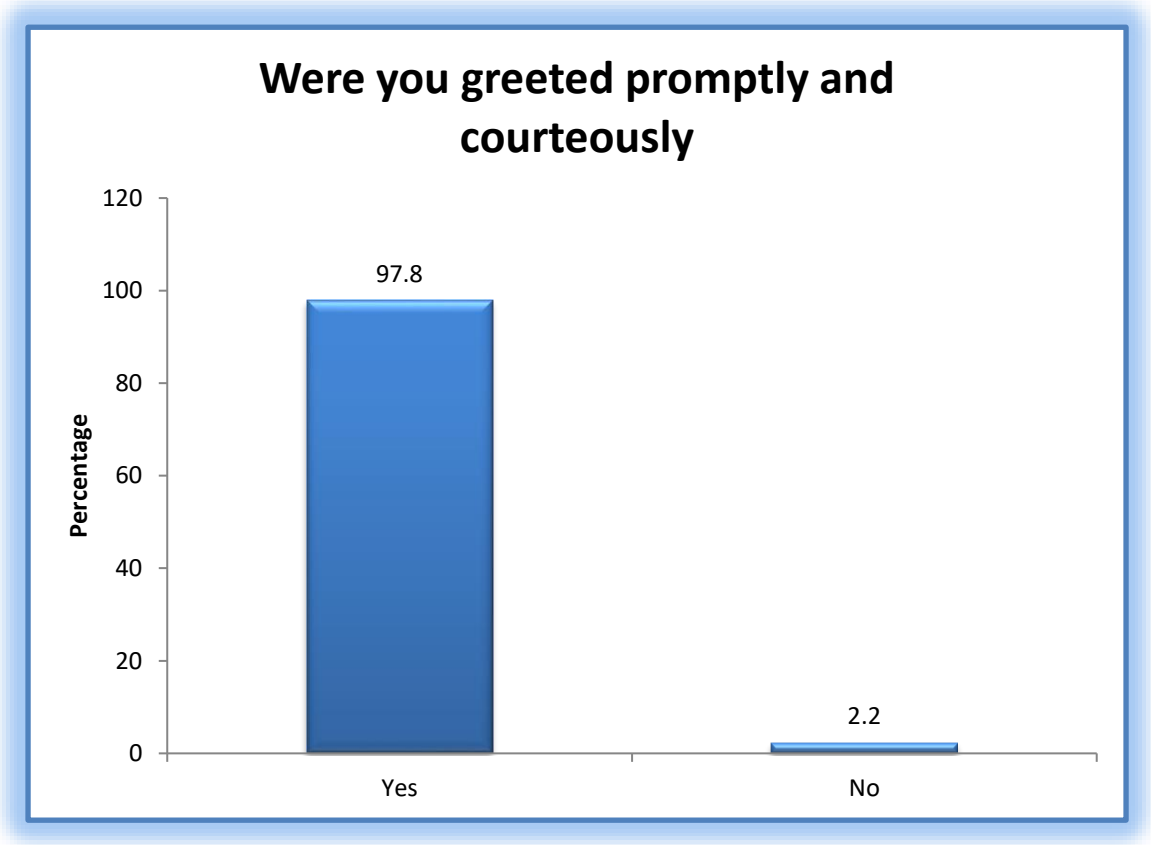


Fig 10 : Patients greeted promptly and courteously

The graph shows that 97.8 % patients thinks that they were greeted promptly and courteously and 2.2 % thinks they were not greeted promptly and courteously.

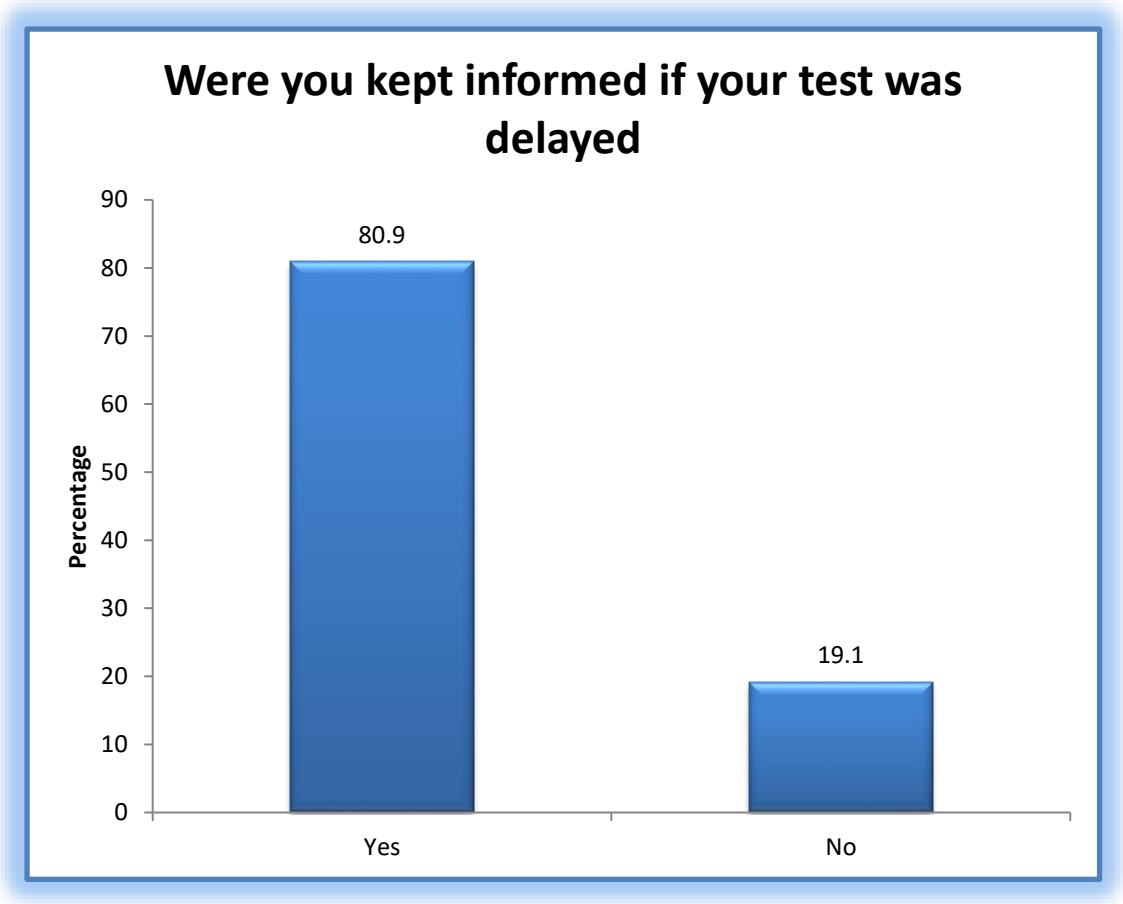


Fig 11: Information regarding the delay of test

In above graph it is shown that 80.9 % were known about the delay of the test while 19.1 % says that they were unknown of any kind of information related to the delay of test.

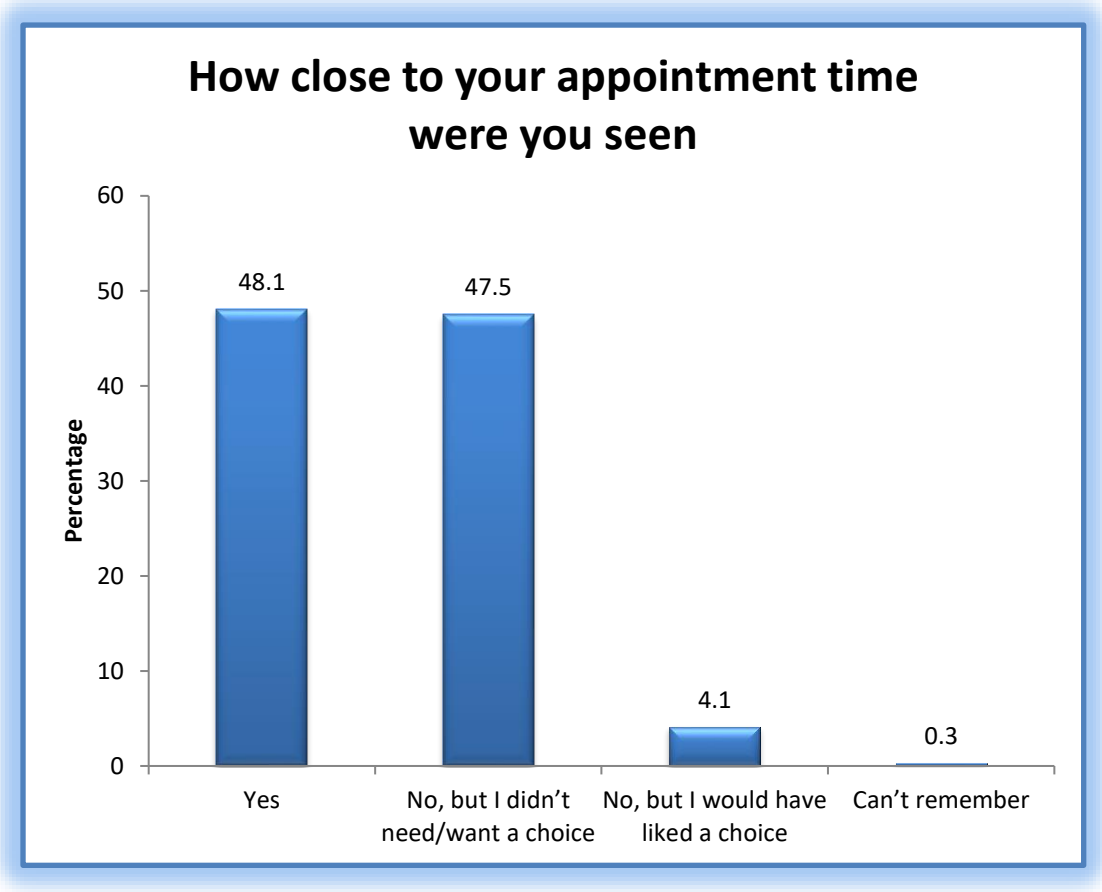


Fig 12: Appointment time as per convenient of patient

The above graph shows that the appointment time for the ST Scan seems closure to 48.1 % patients. However , 47.5 % were saying no and they don't need / want any choice like this. 4.1 % says they would like a choice like this while 0.3 % says they can remember any such facility.

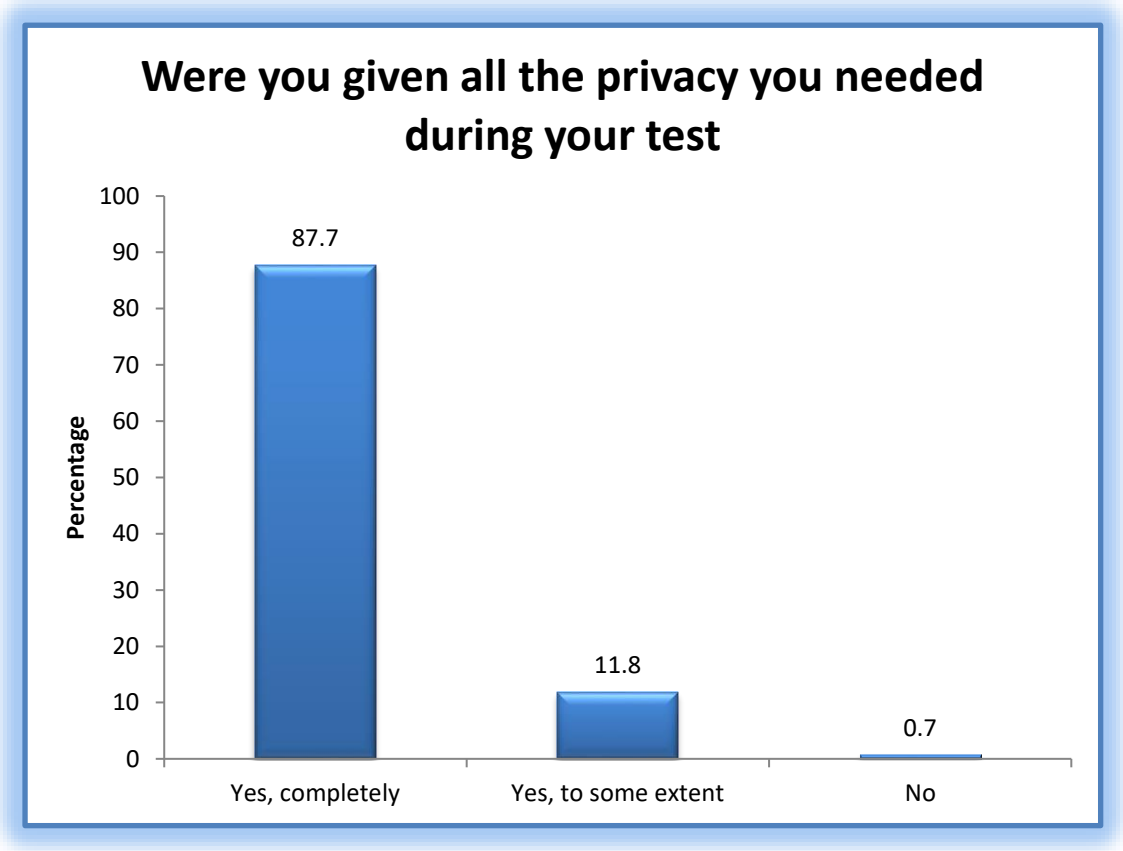


Fig 13: Privacy of patients during CT Scan

The above graph showing 87.7 % of patients agree with the privacy provided during the test, while 11.8 % says yes they are provided the privacy but to some extent, 0.7 % says no to such kind of facilities.

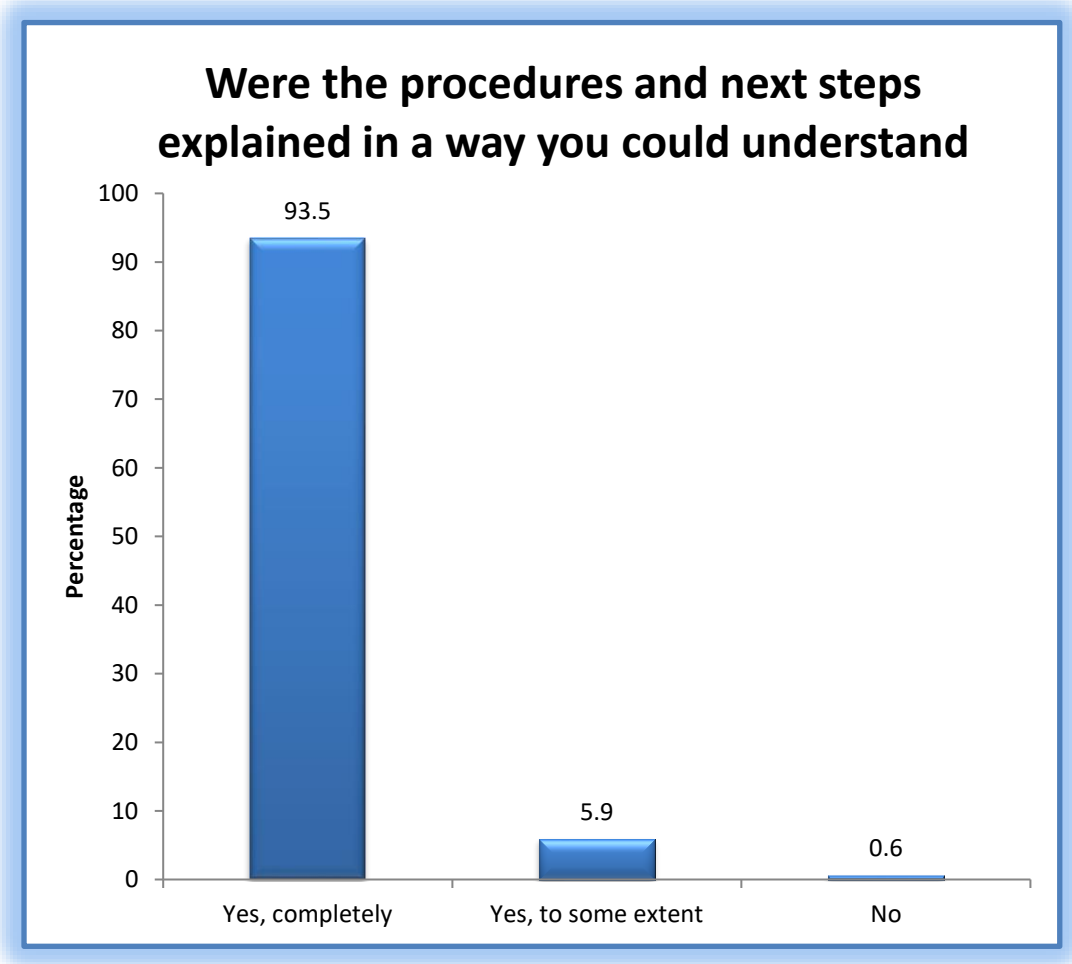


Fig 14: Procedure and next steps explained to patients

The above graph depicts that 93.5 % patients were explained about the procedures and next steps done on them while performing the CT Scan, whereas 5.9 % patients can' t remember this, 0.6 % says no to such facilities.

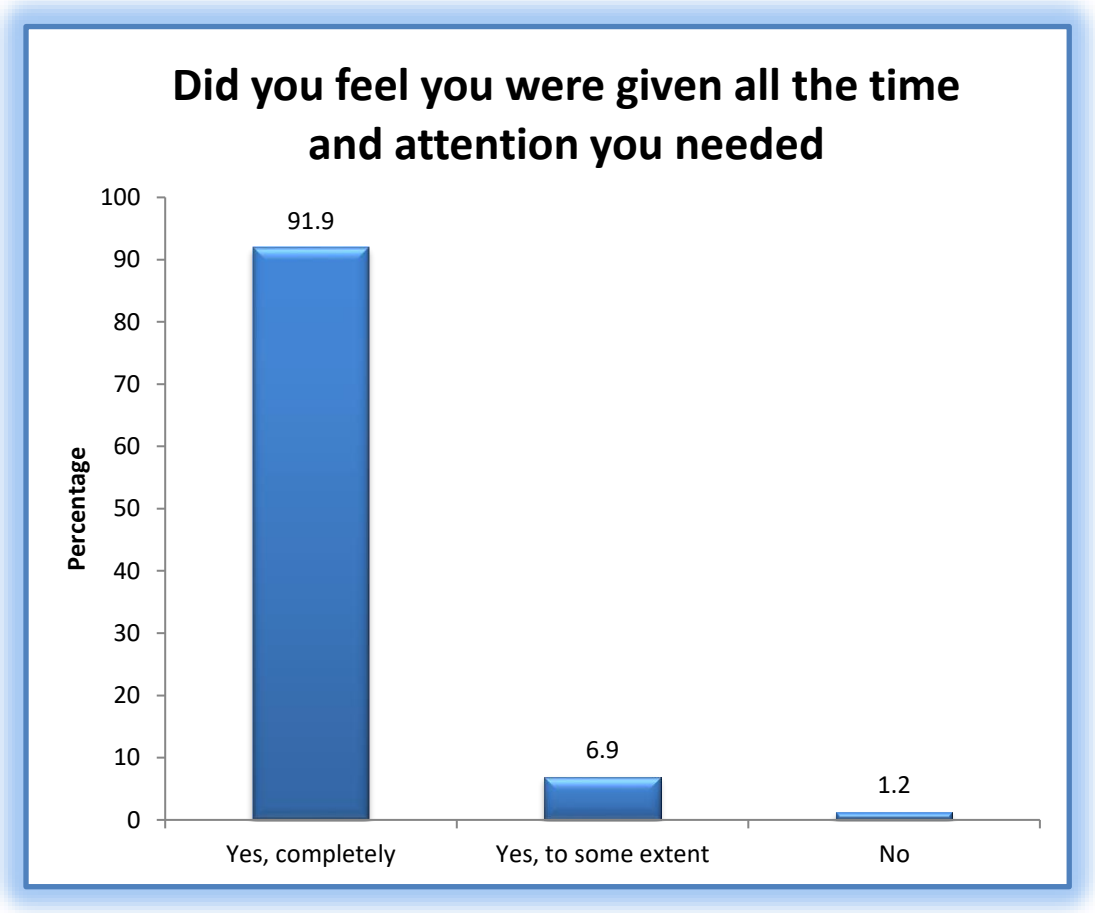


Fig 15: Time and attention needed

The graph shows that 91.9 % patients feel that they were provided with all the time and attention needed, while 6.9 % says yes they are provided with some extent while 1.2 % says no for such facility.

3.3 Users Satisfaction Summary

This summary is based on 20 responses (Doctors, CT Scan technician) between 1 April 2010 and 30 April 2010.

3.3.1User Satisfaction Index

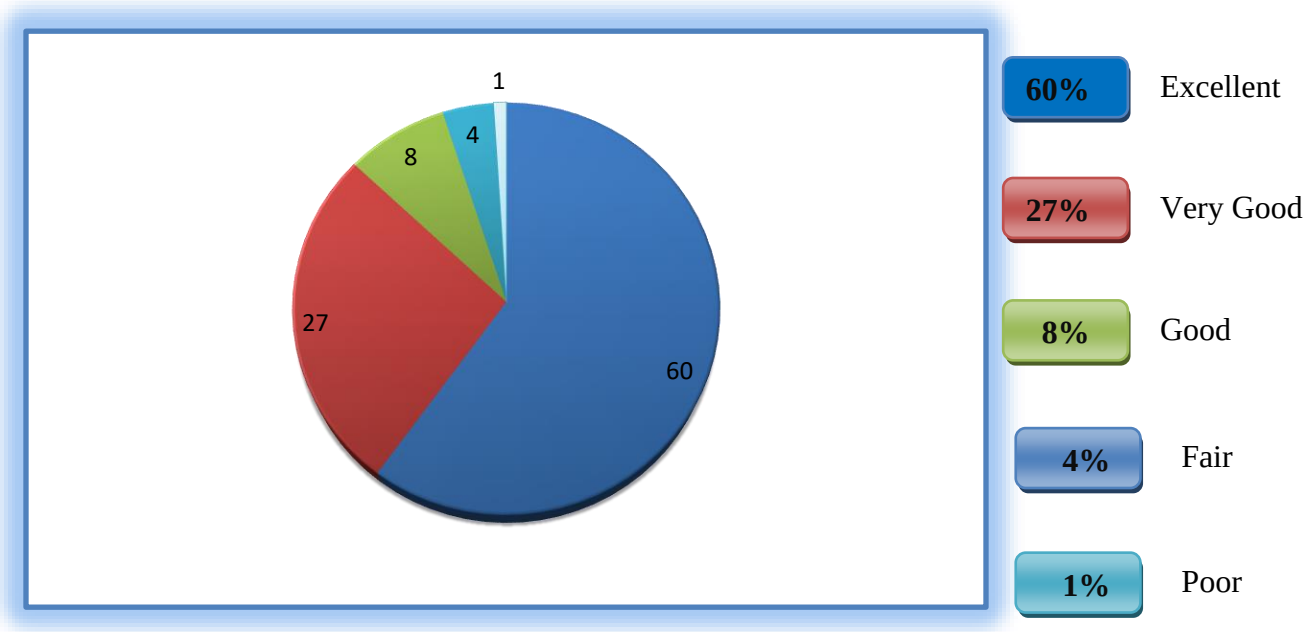


Fig 16: Cumulative rating of quality of services in User Satisfaction Survey

Main points to note – overall results:

1. 95% of users rated the service as 'good' or better
2. 85% users found the helpfulness of the staff and the information provided as 'good' or better.
3. 71% of users would recommend the service.

Chart shows how the question 'How do you rate the Service overall you received provided by the Nanavati Hospital for CT Scan in PPP Model' ' was answered. Percentages are rounded to the nearest whole number.

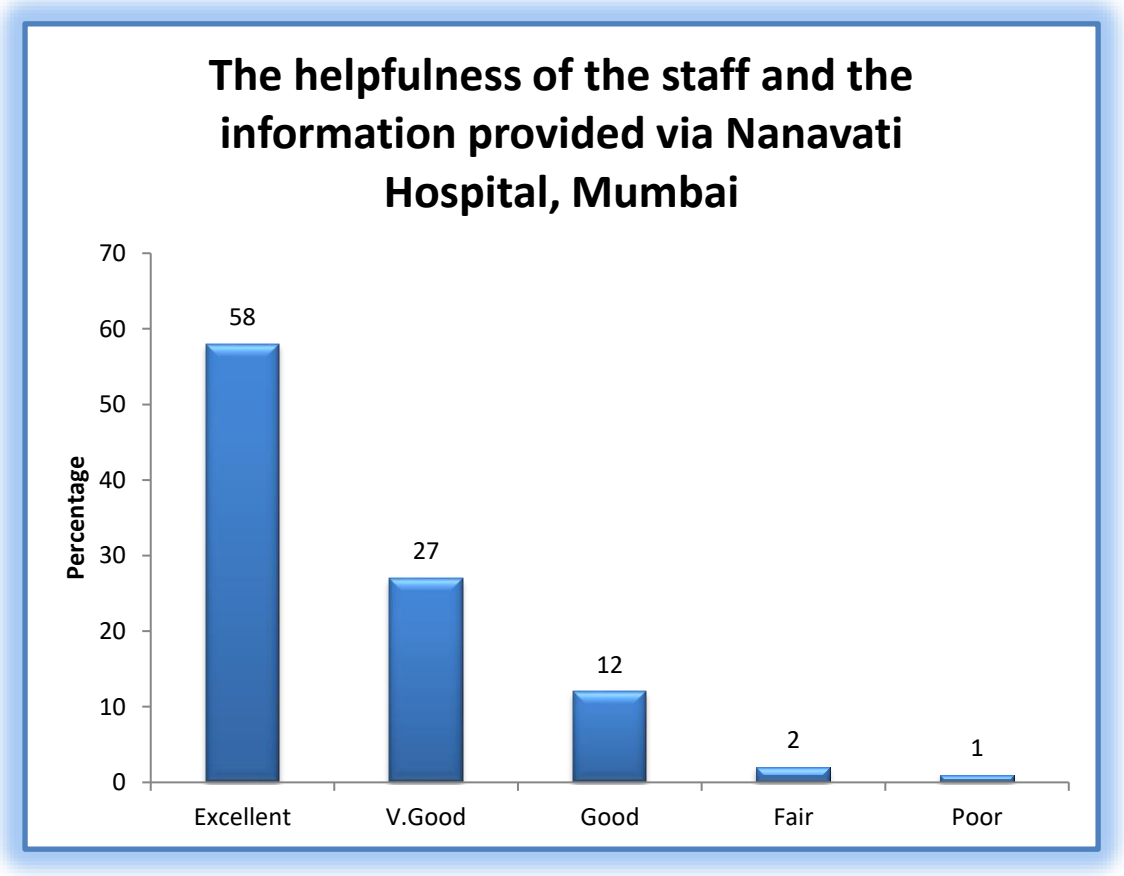


Fig 17: The helpfulness of the staff and the information provided via Nanavati Hospital, Mumbai

The above graph depicts that 58 % patients rated the helpfulness of the staff and the information provided via Nanavati Hospital, Mumbai as excellent, while 27 % rated very good. 12 % rated good and 2 % and 1 % rated it fair and poor respectively

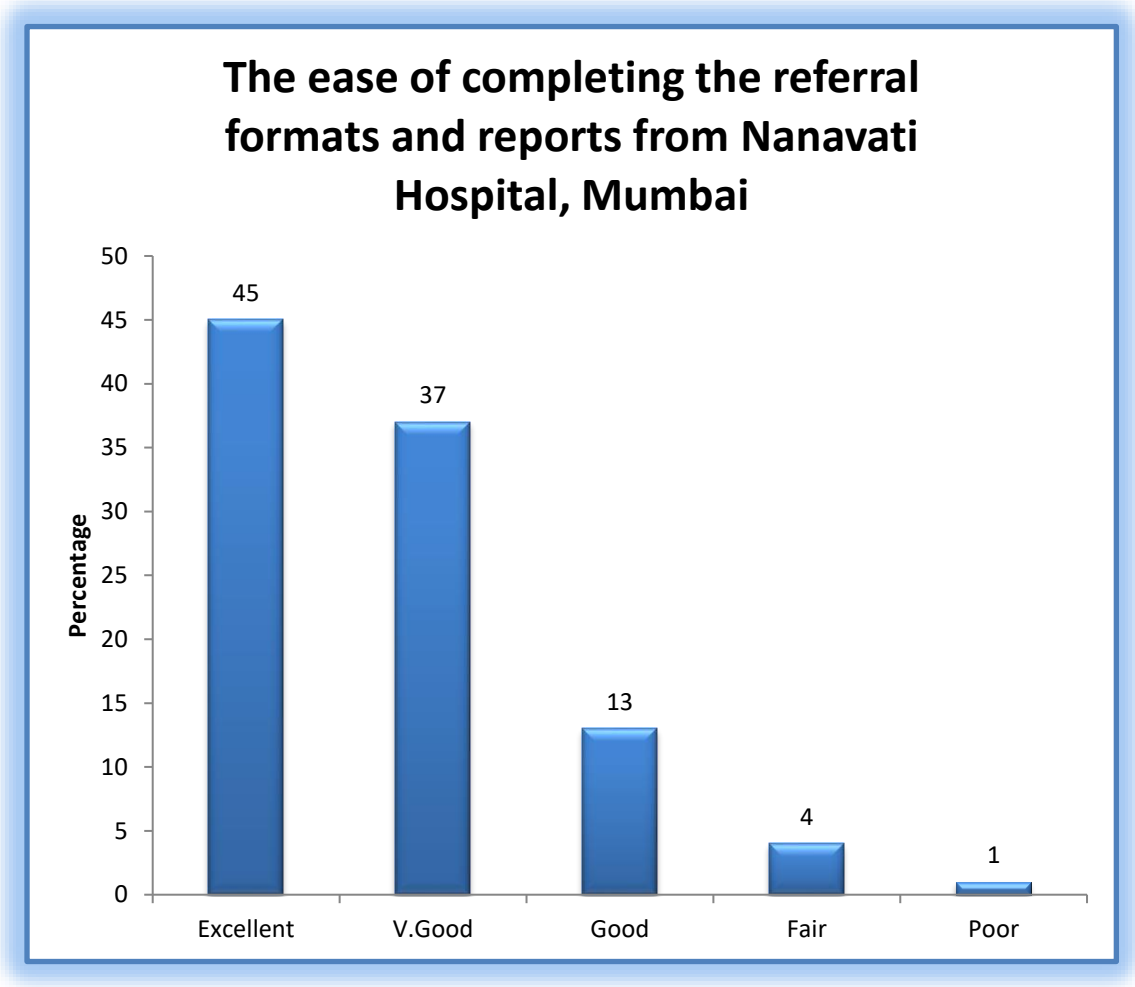


Fig 18: The ease of completing the referral formats and reports from Nanavati Hospital, Mumbai

The above graph depicts that 45 % patients rated the ease of completing the referral formats and reports from Nanavati Hospital, Mumbai as excellent, while 37 % rated very good. 13 % rated good and 4 % and 1 % rated it fair and poor respectively

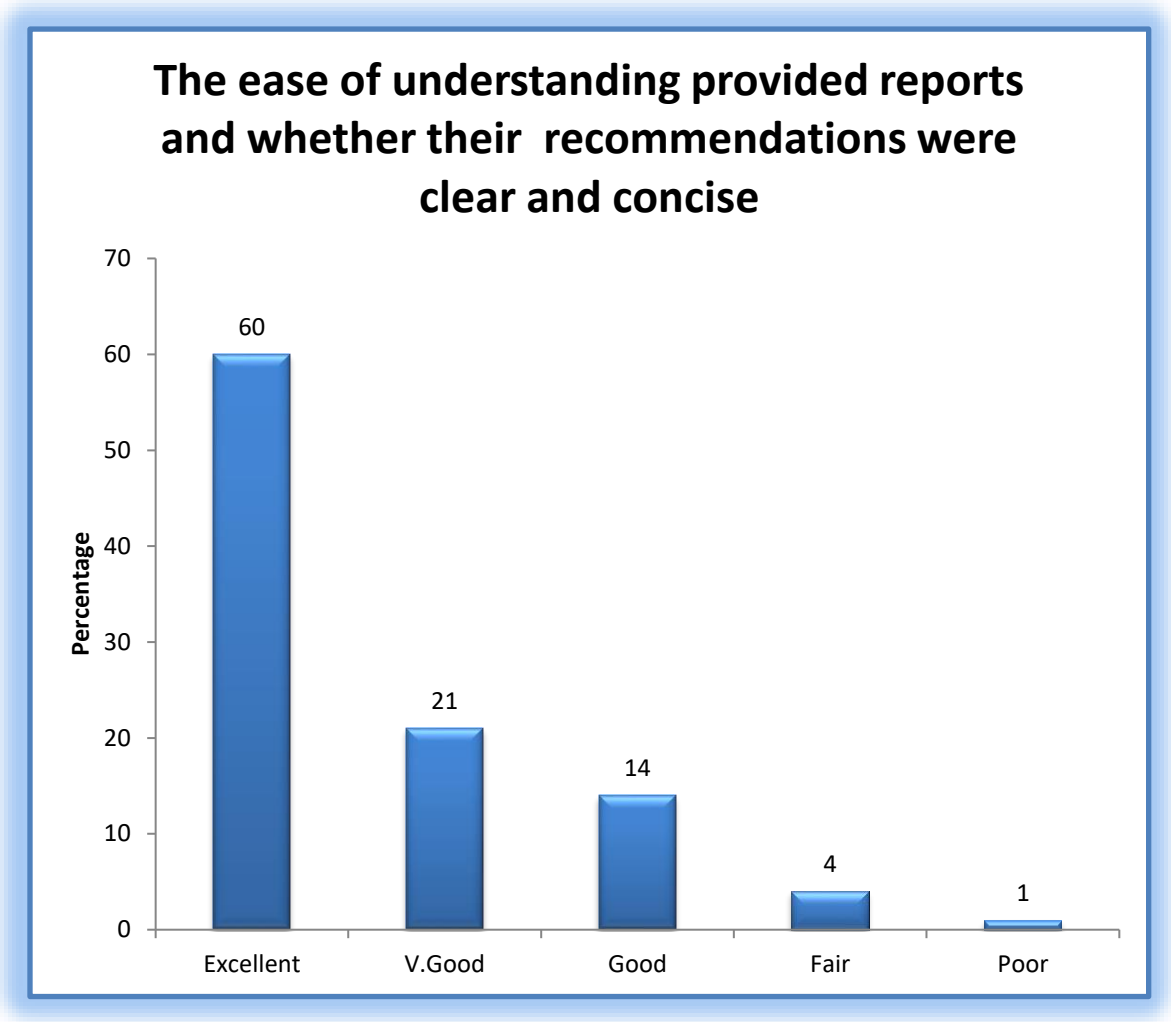


Fig 19 : The ease of understanding provided reports and whether their recommendations were clear and concise

The above graph depicts that 60 % patients rated the ease of understanding provided reports and whether their recommendations were clear and concise as excellent, while 21 % rated very good. 14 % rated the information good and 4 % and 1 % rated it fair and poor respectively

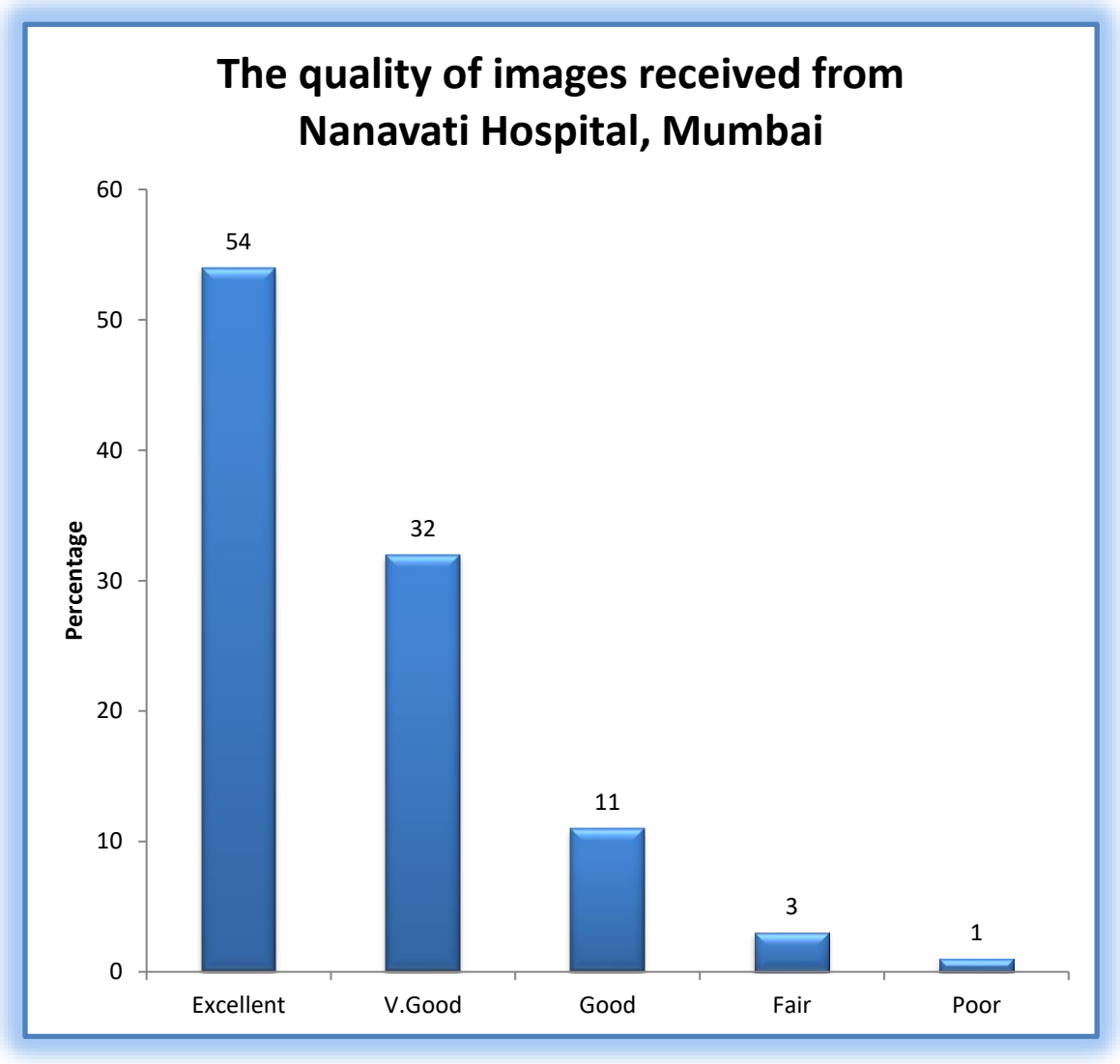


Fig 20: The quality of images received from Nanavati Hospital, Mumbai

The above graph depicts that 54 % patients rated the quality of images received from Nanavati Hospital, Mumbai as excellent, while 32 % rated very good. 11 % rated the information good and 3 % and 1 % rated it fair and poor respectively

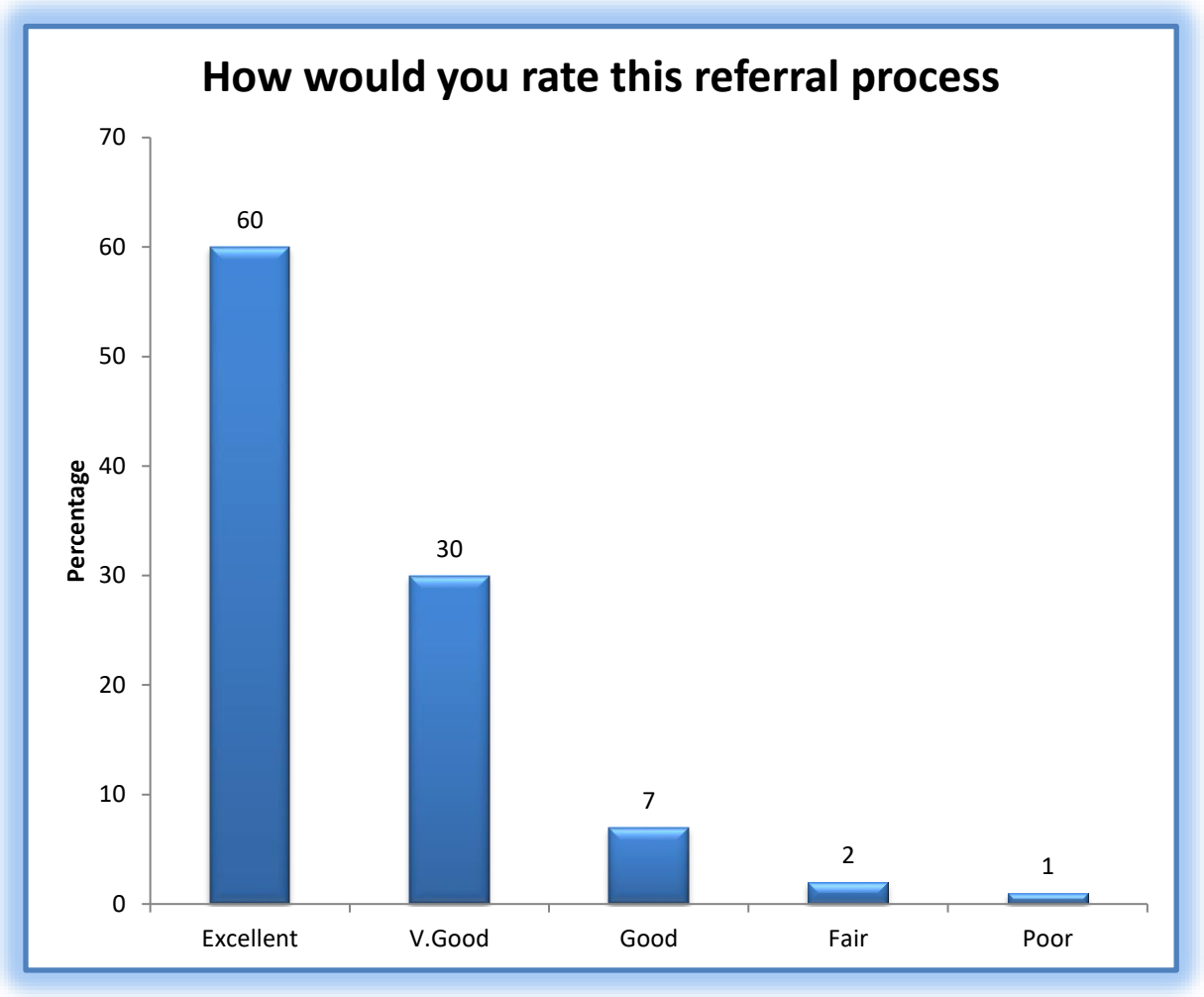


Fig 21: The referral process

The above graph depicts that 60 % patients rated the referral process as excellent, while 30% rated very good. 7 % rated good and 2 % and 1 % rated it fair and poor respectively

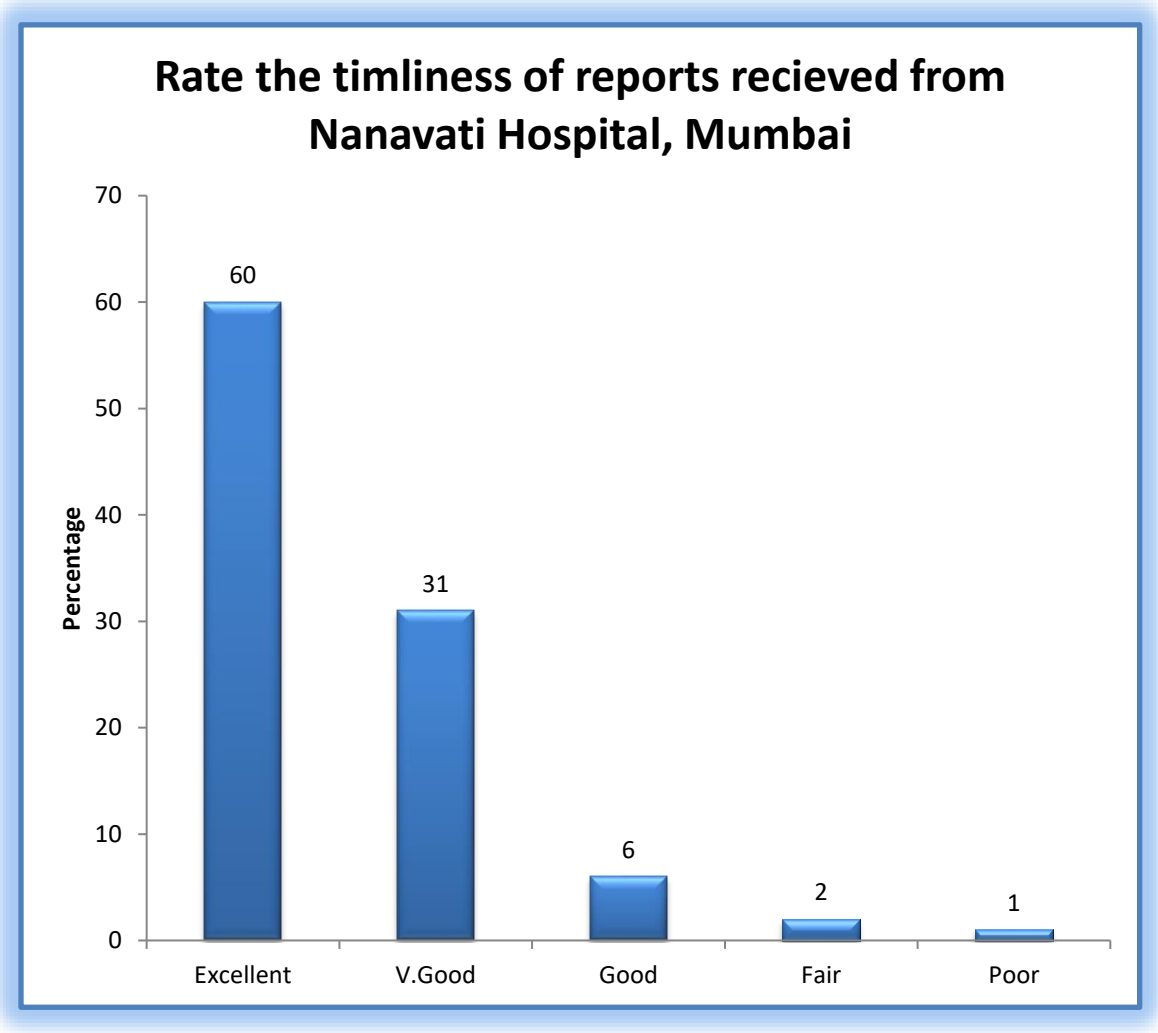


Fig 22: The timliness of reports recieved from Nanavati Hospital, Mumbai

The above graph depicts that 60 % patients rated the timliness of reports recieved from Nanavati Hospital, Mumbai as excellent, while 31 % rated very good. 6 % rated the information good and 2 % and 1 % rated it fair and poor respectively

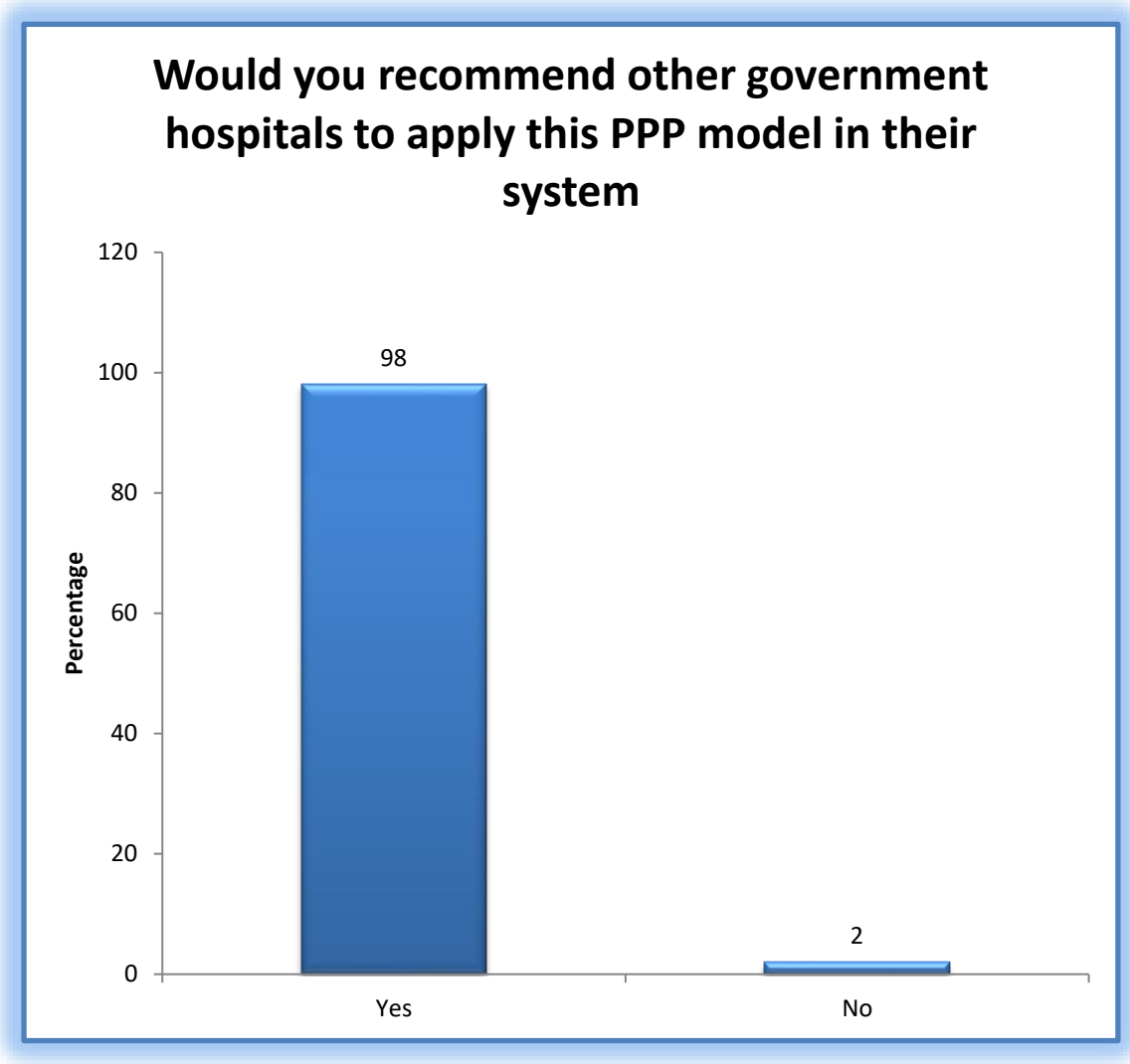


Fig 23 : Would you recommend other government hospitals to apply this PPP model in their system

The above graph depicts that 98 % patients ready to recommend other government hospitals to apply this PPP model in their system whereas 2 % are saying no for this facility

3.4 Process Flow Chart

Process wise data collection is done after all data was collected and, the next step is analyzing the data thoroughly for each work process. Analyzing data based on systematic observation and the process chart, which recorded all the relevant facts about the work process.

Examine each recorded fact critically. Then, we can detect which part are nonproductive and take a long time in the work process.

Patient wise data analysis is done by conducting a satisfaction survey

Step 1: Select

In this step identified topic is selected i.e. Time-motion study of Patient reached for CT Scan with respect to the activities done per patient everyday and streamlining

Step 2: Record

The activities involved are being recorded and flow chart has been made as follows:

1. The study can be carried out by preparing process chart, which is a chart to record a process in a compact manner, as a means of understanding and improving it.
2. The process chart explains systematically the series of actions done during the work process
3. The process chart is prepared based on certain number of symbols i.e. Operation. Transportation, Inspection,
4. Delay and Storage. Sometimes few /activities may be combined also.

Operation: An operation represents the real work that is carried out, mainly the time spent on treatment to patient directly.

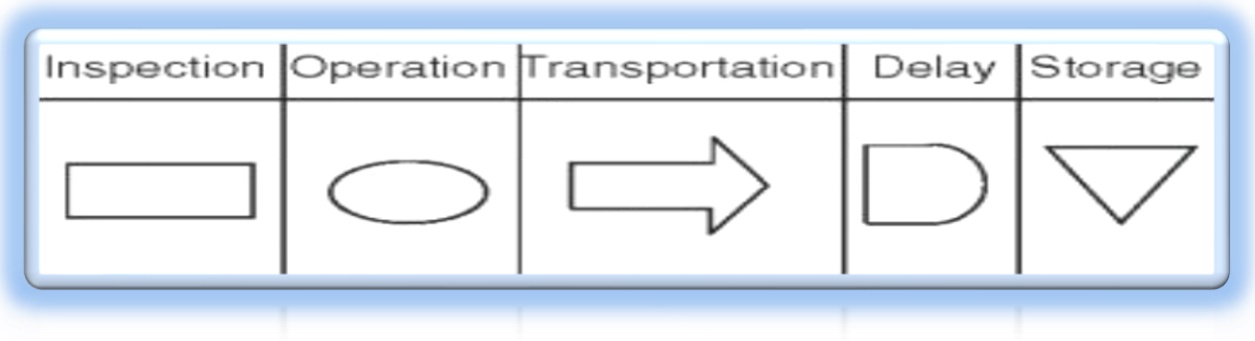
Transportation: The staff moves certain object or moving one place to another place, except when the movement is not part of the operation and inspection.

Inspection: Inspection means a person examining the work accuracy or checking the materials required or checking and comparing with a standard as quantity or quality.

Delay: There may be some gap between activities or before performing the next action some delay due to various reasons.

Storage: Storage occurs when the activity is stopped and it is not performed.

Symbols for activities



S.no	Activity					
1.	Hands over registration slip					
2.	Hands over money					
3.	Take cash receipt					
4.	Arrives at CT Scan					
5.	Gets registered					
6.	Gets counseled for the process					
7.	Moves to CT machine					
8.	Gets scanned					
9.	Moves to technician back again					
10.	Receive instructions for report collection					
11.	Collects report					

Fig 24: Process Flow Chart For Maintained Activities for Man (Patient)

Step 3 Examine

In the entire process of CT Scan , personnels has done following activities.

1. Inspection: Personnel have done 0 activities of inspection
2. Operation: Personnel have done 7 activities of operation
3. Transportation: Personnel have done 3 activities of transportation
4. Delay: Personnel have done 1 activities of delay
5. Storage: Personnel have done none activities of storage

Step 4 Develop

Analyzing the above activities, we can say that the utilization pattern and the usage of CT scan is in excellent mode. The distance of CT Scan is in visible range and the waiting time for a CT Scan is minimum and in acceptable mode.

CHAPTER 4

CONCLUSION AND RECOMMENDATIONS

4.1 Conclusions

The CT Scan department, District hospital, Ambikapur is serving the community in an efficient manner catering to the CT Scan requirements in a well managed manner. It meets all the necessary guideline required.

The bottlenecks identified in the CT Scan department, District Hospital, Ambikapur are as under -

1. There is no radiologist present in hospital.
2. ere is no full fledged permanent staff available for the CT Scan department. Only one technician working on contaractual basis (From Jeewan Deep Samiti) from past six years and undertaking the whole work alone.
3. The batch contrast of the CT Scan is not done in physical presence of any MBBS doctor, which is an necessary requirement.
4. There is no emergency kit available in the CT Scan department in case of urgency.
5. There are no SOPs available for the CT Scan Department.
6. Absence of emergency tray, Oxygen cylinder and fire extinguisher in the CT Scan department.

4.2 Recommendations

1. Fulfilling the human resource gaps for better quality of services.
2. Available of all the equipments and facilities desired for successful operationalization of CT Scan Department.
3. Preparation of SOPs of CT Scan Department and implementation of same to the other distrct hospitals of Chhattisgarh.
4. Developing this PPP model to the other d\District Hospitals of Chhattisgarh.

REFERENCES

1. Donabedian A. *The Quality of Care: How can it be assessed?* Journal of the American Medical Association 1988; 260: 743-1748.
2. Mishra S. K. ,Gupta.D, Kaur.J. "Telemedicine in India : Initiatives and vision"
3. emedicine health, "Introduction of CT Scan", http://www.emedicinehealth.com/ct_scan/article_em.htm, *Assesed April 22,.2010.*
4. 4.Ragavan .D, Indian J Radiol Imaging/ August 2008/ Volume 18/ Issue 3, Site http://www.ijri.org *Assesed April 15,.2010.*
5. Ragavan .D, Indian J Radiol Imaging/ August 2008/ Volume 18/ Issue 3, Site http://www.ijri.org accessed on , *Assesed April 15,.2010..*
6. Ralph M. Barnes (2001). *Motion and Time Study – Design and Measurement of Work.* Seventh Edition. John Wiley and Sons Inc, *Assesed April 15,.2010.*
7. Bon. A .T , Ariffin. A "An Impact Time Motion Study On Small Medium Enterprise Organization"
   Site www.globalresearch.com.my/main/papers/.../PAPER_107_**ImpactTime**
   Accessed , April 15, 2010.
8. Foster (2003). *Operational Management – Time and Motion Study.ppt*. www.freequality. org /sites_ free quality_org/ document/tranning, *Assesed April 15,.2010.*
9. Hendrich A., Chow M. , Boguslaw A. Skierczynski, Zhenqiang Lu . A 36 – Hospital Time and Motion Study : How Do Medical Surgical Nurses Spend Their Time.
   The Permanente Journal Summer, Vol 12 No.3. Pages25 – 34.
10. Wai Abraham K. C., Chor C. M. , Lee Allen T. C. , Sittambunka Y. , Graham Colin A., Rainer T. H. , "Analysis of trends in emergency department attendances, hospital admissions and medical staffing in a Hong Kong university hospital: 5-year study ". Int J Emerg Med (2009) 2:141–148

ANNEXURES

ANNEXURE- 1

CONSENT FORM FOR CT SCAN

PATIENT NAME…….. AGE/ SEX……..
DATE…….

PROCEDURE : ……

I am explained about the indication of procedures and its consequences (Risk, complication of contrast medium injection) in the language which I understand the most.

I am willing for the study to be done on me/ family member/ friend.

Signature of the Patient/ Relative

ANNEXURE- 2

The Comprehensive Annual Maintenance Service Contract for SIEMENS CT Scan System for :

2.1 SIEMENS SOMATOM EMOTION machine installed at District Hospital, Ambikapur.

Equipment covered under CAMC

Equipment	Sr No	Exclusions
SOMATOM EMOTION	46360	Tube, Consumables and Damages

Annual Maintenance Service Contract Price:

No	Period	Amount (Rs)	Service Tax 10.2 %	Total (Rs)
01	07 May 2006 – 06 May 2007	Rs 9,90,000 /-	Rs 91, 800 /-	Rs 9,91,800 /-
02	07 May 2007 – 06 May 2008	Rs 10,89,000 /-	Service Tax as applicable	Rs 10,89,000/- +ST as applicable
03	07 May 2008 – 06 May 2009	Rs 11,97,900 /-	Service Tax as applicable	Rs 11,97,900 /- + ST as applicable

2.2 SIEMENS MAKE KLINOSKOP H/ HELIOPHOIS D, 500 Ma X- RAY MACHINE

Equipment covered under CAMC

Equipment	Sr No	Exclusions
KLINOSKOP H/ HELIOPHOIS D- 01 NO.	03742/ 03541	All Consumables and Damages

Annual Maintenance Service Contract Price:

No	Period	Amount (Rs)	Service Tax 10.2 %	Total (Rs)
01	01 March 2007 – 29 Feb 2008	Rs 80,000 /-	Rs 9,792/-	Rs 8,9,792 /-
02	01 March 2008 – 29 Feb 2009	Rs 88,000 /-	Service Tax as applicable	Rs 88,000/- +ST as applicable
03	01 March 2009 – 29 Feb 2010	Rs 96,800 /-	Service Tax as applicable	Rs 96,800 /- + ST as applicable

ANNEXURE- 3

Patient Satisfaction Survey

Section- 1

S. No.	Attributes	Poor	Fair	Good	Very Good	Excellent
3	Behavior of staff during the test					
4	The standards of the facility					
5	The cleanness of the facility					
6	The overall quality of services					
8	Were you kept informed if yout test are delayed					
10	Were you given all the priority needed during your test					

Section- 2

S. No.	Attributes	Yes	No, but I didn't need/want a choice	No, but I would have liked a choice	Can't remember	No
1	Were you given choice of appointment time for CT Scan					
7	Were you greeted promptly and courteously					
8	Were you kept informed if yout test was delayed					
9	How close do your appointment time for CT Scan were you seen					
10	Were you given all the priority needed during your test					
11	Were the procedures and next steps explained in a way you could understand					
12	Did you feel you were given all the time and attention you needed?					

User Satisfaction Survey

Section: 1

S. No.	Attributes	Poor	Fair	Good	Very Good	Excellent
1	The helpfulness of the staff and the information provided via Nanavati Hospital, Mumbai					
2	The ease of completing the referral formats and reports from Nanavati Hospital, Mumbai					
3	The ease of understanding provided reports and whether their recommendations were clear and concise					
4	The quality of images received from Nanavati Hospital, Mumbai					
5	How would you rate this referral process					
6	Please rate the timliness of reports recieved from Nanavati Hospital, Mumbai					

Section: 2

S. No.	Attributes	Yes	No
7	Would you recommend other government hospitals to apply this PPP model in their system		