



**Artemis Health Institute
(April 9 - June 1, 2012)**

**Waiting Time in the Imaging Services at a Tertiary Care Private
Hospital in North India**

By

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**Under the guidance of
Dr. Alok Kumar Mathur**

**Post Graduate Diploma in Hospital and Health Management
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**Institute of Health Management Research,
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Certificate

This is to certify that Dr. Shihad Khader from Institute of Health Management Research, Jaipur has undergone Summer Training at Artemis Health Institute, Gurgaon, Haryana from 9th April, 2012 to 2nd June, 2012.

The candidate himself carried out the project. His approach to the study has been sincere, scientific and analytical. This summer training is partial fulfillment of the course requirement is recommended for the award of post graduate diploma in Hospital management.

I wish him success in all his future endeavors.



Dr. P.R. Sodani
Dean (Academic and Students Affairs)
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Dr. Alok Mathur
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Certificate

This is to certify that **Dr. Shihad Khader**, student of PGDHM from Institute of Health Management Research, Jaipur has completed his project titled **“A report on waiting time in the Imaging Department at a tertiary care private hospital of North India”** under my supervision.

To the best of my knowledge this project is the original work of the candidate. I am fully satisfied with the project work.

2nd June 2012
Gurgaon



Dr. Mohammed Anwarul Haque
Deputy Medical Superintendent
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Acknowledgment

The summer internship at ARTEMIS HEALTH INSTITUTE, Gurgaon offered both a learning experience as well as a glimpse into the daily management functions of a renowned private hospital. I was fortunate enough to interact with people, who in their own capacities have encouraged and guided me.

My mentors and guide have helped me to achieve my goal and incorporate motivation into me. My long and extended thank you note would start with thanking few but the most important people. First of all, I would like to thank **Dr. Devlina Chakravarty, COO** for providing me an opportunity to do my internship at Artemis.

I would like to thank **Mr. Bishwajit Das, Head HR** and **Ms. Ramanjit kaur, team leader (training and development)** for selecting me and trusting my capabilities to prove myself.

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I am highly obliged to **Dr. S.D. Gupta (Director, IIHMR)**, **Dr. (Brig) S.K. Puri (Dean, academic and students' affairs)** and to my mentor **Dr. Alok Mathur** in the institute for crafting my interest in this stream, providing necessary suggestions and guiding me to complete this report.

Finally I Acknowledge my indebtedness to the staff of Artemis Health Institute, Gurgaon who answered of all my queries and as well as invaluable support and continuous help to the successful completion of my training.

2nd June 2012

Dr. Shihad Khader

IIHMR, Jaipur

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Abbreviations

AHI	- Artemis Health Institute
AHS	- Artemis Health Sciences
BARC	- Bhabha Atomic Research Centre
CT	- Computed Tomography
CTVS	- Cardio Thoracic and Vascular Surgery
ER	- Emergency
GDA	- General Duty Assistant
HOD	- Head Of the Department
HIS	- Hospital Information System
HR	- Human Resource
ICU	- Intensive Care Unit
IPD	- Inpatient Department
IT	- Information Technology
IGRT	- Image Guided Radiation Therapy
JCI	- Joint Commission International
NABH	- National Accreditation Board for Hospitals and Healthcare Providers
NAT	- Nucleic Acid Amplification Test
OPD	- Outpatient Department
PCS	- Patient Care Services
PACS	- Picture Archiving and Communication System
PET	- Positron Emission Tomography
RIS	- Radiology Information System
SOP	- Standard Operating Procedure
TLD	- Thermo Luminescent Dosimeters

Artemis Health Institute

Artemis Health Institute (AHI) is a NABH accredited 300 beds, super speciality, tertiary care hospital by Artemis Health Sciences (AHS) located in Gurgaon, in the national capital region of New Delhi, India. Designed to be one of India's most advanced Hospitals, Artemis has some of the world's finest technology and equipment. The medical practices and procedures followed at the hospital are research oriented and benchmarked against the best in the world. The doctors at Artemis have trained abroad and have certification from foreign board. The hospital delivers world-class services in a warm, open, patient centric environment.

A sprawling campus of 9 acres has the potential of adding another 300 beds taking the total bed strength to 600. the super specialities chosen by Artemis as its area of focus include cardiology, joint replacements, neurosciences & minimally invasive surgery.

The hospital handles a large number of patients a year, which includes international patients as well. International patients come to 'Artemis Health Institute' from the USA, UK, Europe, Middle East, Australia, Africa and CIS countries, among other countries.

Highlights

- Artemis Health Institute, Gurgaon was awarded as the most promising start up health care company of the year 2007 at the 'Health care Excellence Awards 2008' organised by the Express group and Express healthcare.
- Best IT implementation for the year 2008 from PC Quest magazine.
- One of the Paperless Hospitals in India, to have a full blown electronic hospital information system.
- Accredited by National Accreditation Board for Hospitals and Healthcare providers(NABH)
- Currently in the process of preparing for Joint Commission International (JCI) assessment.
- First and only centre in Haryana, which is licensed and government accredited for fertility preservation services for cancer patients.
- Intelligent critical patient monitoring with clinical decision support system.

Artemis Health Institute is promoted by the Apollo Tyres Group and is highly regarded for its professional management. The name 'Artemis' depicts the ancient Greek goddess and the sister of Apollo (Greek God of Medicine). The logo of Artemis is the 'Art of Healthcare' that signifies that the 'patient is always in good hands' and encapsulates the philosophy of care and patient focus. Artemis Health Institute aims to define and deliver cutting edge healthcare in India by uniquely integrating healthcare delivery with research and development, medical education and manufacturers of medical devices and equipment. Artemis is also working closely with local communities towards community welfare, social well being and improvement of health in the community at large.

Key Differentiators

- A technology tie up with Philips medical systems allows Artemis early advanced monitoring equipment.
- The real time Image Guided Radiation Therapy (IGRT) is one it kind and offers radiation exactly where required, with minimal impact on healthy cells.
- An Endovascular Suite equipped with the latest in 3D rotational catheterisation or peripheral endovascular procedures with precision.
- An in-house Bio-repository and a 24 hour blood bank with facility (Nuclear Amplification test)
- One of the very few operational paediatric ICU and Neonatal ICU in North India.

Vision, Mission and Core values

Vision

To create an integrated world class healthcare system, fostering, protecting, sustaining and restoring health through the best in class medical practices and cutting edge technology developed through in depth research carried out by the world's leading scientific minds.

Mission

- Deliver world-class patient care services
- Excel in the delivery of specialised medical care supported by comprehensive research and education.
- Be the preferred choice for the worlds leading medical professionals and scientific minds.
- Develop, apply, evaluate and share new technology.
- Be an active partner in local community initiatives and contribute to tis wellbeing and development.

Core Values

Care for Customer

Respect for associates

Excellence through teamwork

Always learning

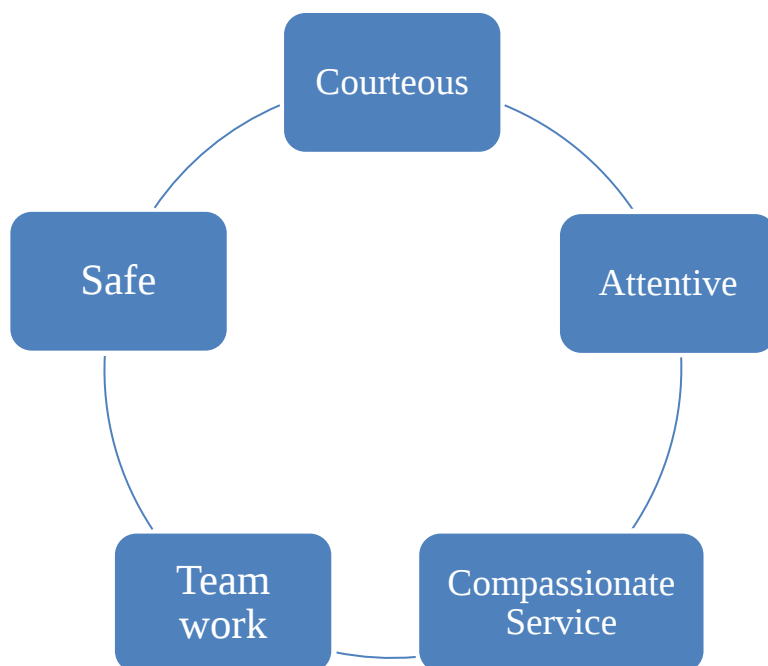
Trust mutually

Ethical practices

Quality Policy at Artemis

- Deliver world class patient care through medical excellence.
- Create a patient centric environment.
- Ensure high standards and safety treatment during the patient safety.
- Continuous quality improvement through implementation of robust clinical and non clinical process and protocols.
- Having world-class infrastructure and cutting edge technology utilised by highly skilled employee.
- Complying with statutory regulations.

Artemis Service Standards:



Services at Artemis Health Institute:

- Oncology
- Cardiology & CTVS
- Nephrology with Urology
- Kidney transplant unit
- General laparoscopic unit
- Minimally invasive surgeries
- Bariatric surgeries
- Plastic surgeries
- Orthopaedics
- Obstetrics and gynaecology
- Paediatrics and surgeries
- Pulmonology
- Pain medicine
- Blood bank
- 24 hour emergency
- ENT
- Dermatology
- Dietetics
- Endocrinology
- Gastroenterology
- Neurology & Neurosurgery
- Internal medicine
- Ophthalmology
- Physiotherapy
- Psychiatry
- Speech therapy
- Urology

Radiology Department

The Department of Radiology at Artemis Health Institute is dedicated to high quality medical imaging and sub specialised interpretation of those images. The department provides imaging and interpretation services to all inpatient and outpatient facilities. All forms of diagnostic and interventional radiological procedures including sophisticated vascular and Neuro-interventional procedures are performed.

- Body imaging (X-rays, Mammography, Ultrasound, MRI & CT)
- Interventional radiology (Biopsy, embolisation, coiling and other minimally invasive procedures)

Radiology department is fully backed by radiology information system (RIS) – a repository of patient data and reports which contribute to electronic medical records. RIS is a computerised database used by radiology to store, manipulate and distribute patient radiological data and imagery. RIS assist in patient tracking & scheduling, result reporting and image tracking. RIS complements the HIS (Hospital information system).

The department provides a full support of tertiary care radiology services, including Neuro-radiology and interventional Neuro- radiology, cardio vascular interventional radiology, specialised musculoskeletal, chest and abdomen radiology, women's imaging and nuclear medicine consisting of the linear accelerators, Gamma cameras and PET CT scan.

All diagnostic modalities are linked to the PACS (picture archiving and communication system). PACS at AHI handle images from ultrasound, MRI, positron emission tomography, computed tomography, endoscopy, mammograms, digital radiographs. PACS has the advantage of hard copy replacement remote access and electronic image integration platform.

These activities are conducted on state of the art equipment. Currently, radiology and imaging sciences are operating with

- 3 Tesla MRI equipment
- 64 Slice CT scan
- Digital Mammography
- 4-D ultrasound
- Digital X-ray
- Bone densitometer for femur, spine and whole body BMD.

Radiation Safety Issue:

- At Artemis we have a radiation council that monitors all radiation issues in the hospital.
- Pregnancy is ruled out before any radiation.
- The patient's identification checked before subjecting exposure.
- Additional shielding is provided to all vulnerable patients.
- Corridors are monitored for radiation for any leakage or scatter by the radiation safety officers and readings are tabulated.
- The staff to monitor radiation uses personal monitoring devices.
- The radiation council oversees all these activities.

Policies and procedures:

- BARC guidelines followed.
- PNDT act followed.
- Clear display of signage everywhere.
- Consent form filled before injecting contrast.
- Lead lining on the doors and windows.
- Wearing of gloves, lead, apron, thyroid shield, eye goggles is mandatory.
- TLD badge is compulsory.
- Inventory management by the nursing staff.
- Procurement policies – indented through the HIS
- Wash management – colour coding system followed and sharp containers present.
- Check list before MRI.
- SOP's for all procedures followed.

A report on waiting time analysis in the imaging services at a Tertiary care private hospital in North India

This is a time motion study done on the diagnostic department right from when the patient enters the billing section to when the necessary radiological test is done. Time motion studies are those in which the time taken in the whole process is measured. These studies are performed to do the process improvements. The study purpose is to determine if there are any wasted movements that are repeated and which therefore increase the waiting time for the patients and hence also decrease the productivity of the worker. The studies are used to try to set up workplaces in such a way that a worker can do his/her routine duties as quickly and efficiently as possible.

Method for Establishing Time Motion Study:

- A complex task is broken into small, simple steps.
- The sequence of movements taken by the employee in performance of these steps is carefully observed to detect and eliminate wasteful motion which therefore waste time and reduce the productivity of the worker.
- A set of recommendations are suggested to improve the whole process, thereby decrease the time for each cycle of the process and hence cut down on the costs.

Objectives:

- To study the waiting time for patients at the imaging department.
- To study the overall satisfaction of patients with the imaging services.

Methodology:

Study design: small scale cross sectional study

Sampling:

A non probability purposive sampling technique would be followed. All patients coming to the diagnostics department in the morning and afternoon hours were included in the study.

Sample size: 60

Study location: Artemis Heath Institute, Gurgaon

Inclusion criteria: All OPD patients who consented to be involved in the study.

Exclusion criteria:

- Inpatients (as the process of billing is done at the time of discharge)
- Emergency department patients (complexity involved in collecting data).
- Patients who don't consent to the being involved in the study.

Data collection:

- The Waiting times were recorded by the researcher mainly by observation at the billing and diagnostics section and also by using times from the Hospital Information System (HIS). The patients' each movement within the hospital from the time of entry into the diagnostic billing section to their eventual diagnostic test being done would be recorded.
- Once the test is done, the patient would be asked for their overall satisfaction with the whole process of the diagnostic department and this would be recorded next to their waiting times and both these would be correlated.

Data analysis: The data would be fed into Microsoft excel and would be analysed.

The times to be recorded would involve the following:

T 1 = time of entry of patient at the diagnostic billing counter.

T 2 = time the patients receive the registration form.

T 3 = time the patient gives in the completed registration form.

T 4 = time the PCS staff enters the patient information in the HIS.

T 5 = time the patient leaves the diagnostics billing section

T 6 = time the patient enters the diagnostics department

T 7 = time the patient is checked in the HIS by the radiology staff.

Waiting Time

T3-T2 = Registration Form time (Time taken by unregistered patients to fill in the registration form and hand it over to the PCS staff) – valid only for unregistered patients.

T4-T3 = HIS Registration Time (Time taken by the PCS staff to put in the patient details in the HIS and create a GNID and also includes the time for generating the invoice) – valid only for unregistered patients.

T4-T 1 = Billing waiting time (Waiting time at the diagnostics billing section).

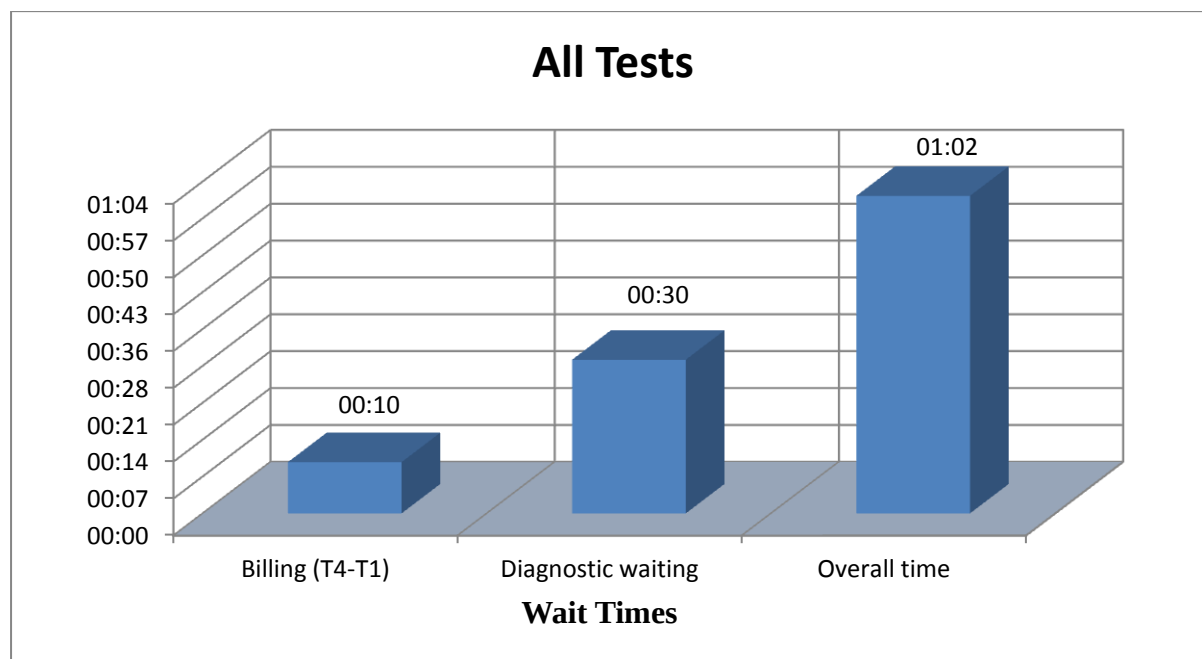
T7-T 6 = Diagnostic waiting time (Waiting time inside the radiology department).

T7-T 1 = Overall Time (Overall time for the patient - from the time he/she enters the diagnostic billing section to the time the he/she enters the respective study room for the test to be done).

Results And Analysis

Table 1.0: Wait Times for all Tests:

Test	Billing Time	Diagnostic Waiting	Overall Time
All Tests	00:10	00:30	01:02

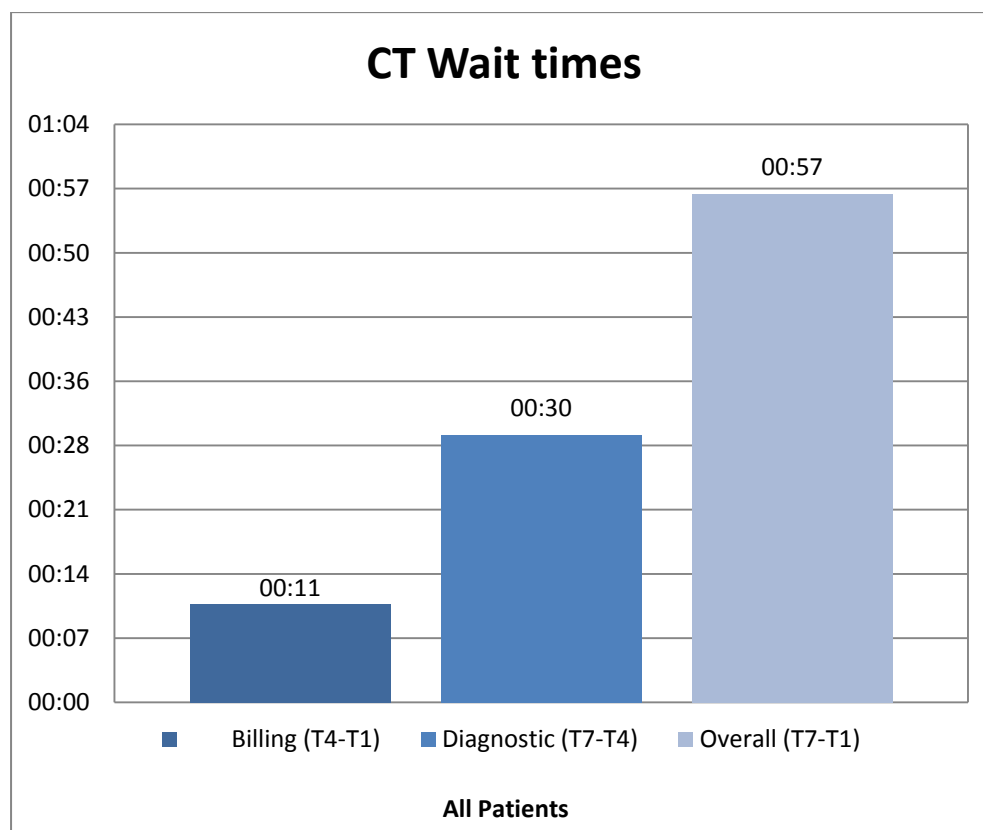


The above table and graph depicts the wait times for patients in all the 3 modalities – CT, Ultrasound and MRI.

- The average wait time at the billing section is 10 minutes. This involves the time when the patient enters the Diagnostic billing section, fills out the registration form if the patient is a new patient with Artemis, registers with the PCS staff, ie as the PCS staff puts in the Patient details in the HIS and the billing for the respective tests are done.
- The average wait time at the Diagnostic section is 30 minutes. This involves the time when the patient exits the billing section and enters the Diagnostic billing section and wait for his/her turn for the respective Test to be done.
- The average time (Overall Time) for the patient from when he/she enters the billing section to the respective test being done is 1 hour and 2 minutes.

Table 2.0: Wait Times for CT for all patients

Test	Billing (T4-T1)	Diagnostic (T7-T4)	Overall (T7-T1)
CT	00:11	00:30	00:57



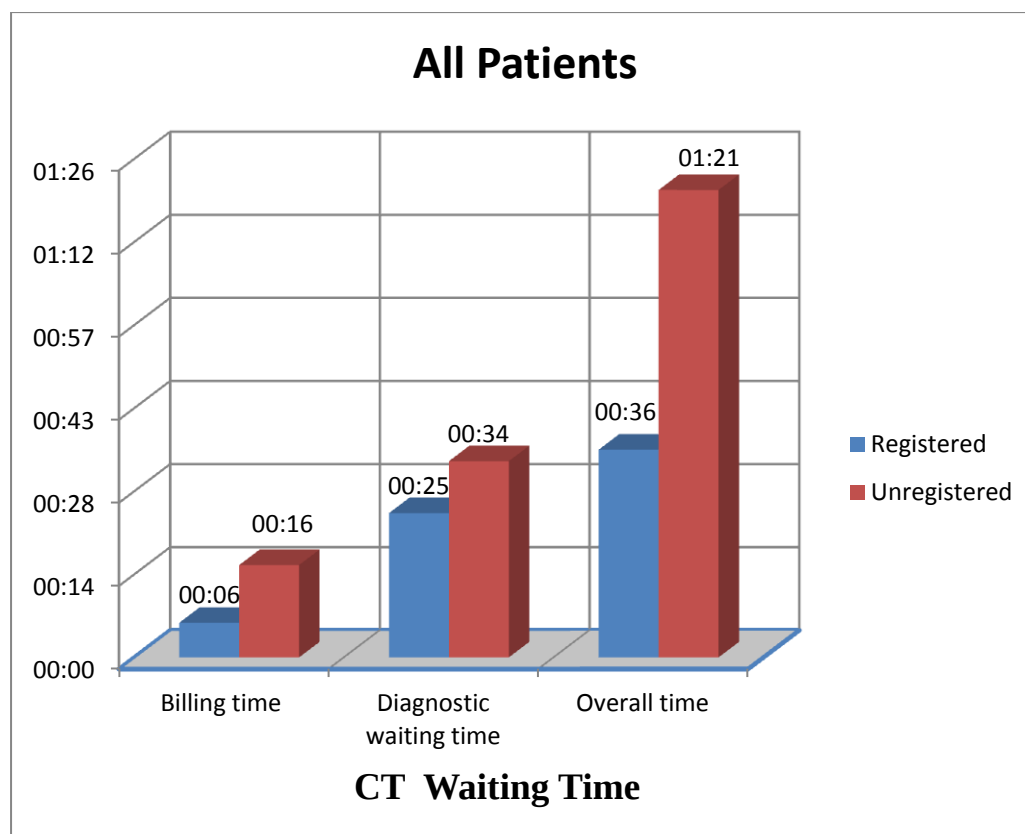
The above table and graph depicts the wait times for all patients intending to do CT.

- The average wait time at the billing section for the CT patients is 11minutes.
- The average wait time at the Diagnostic section outside the CT room is 30 minutes.
- The average time (Overall Time) for the patient from when he/she enters the billing section to the test being done is 57 minutes.

Here, it is observed that as the appointments are already given out, so especially the new patients have to usually wait till a slot is vacant to get the study done.

Table 2.1: Wait Times for CT (Registered and Unregistered patients)

CT	Billing Time	Diagnostic Waiting	Overall time
Registered	00:06	00:25	00:36
Unregistered	00:16	00:34	01:21

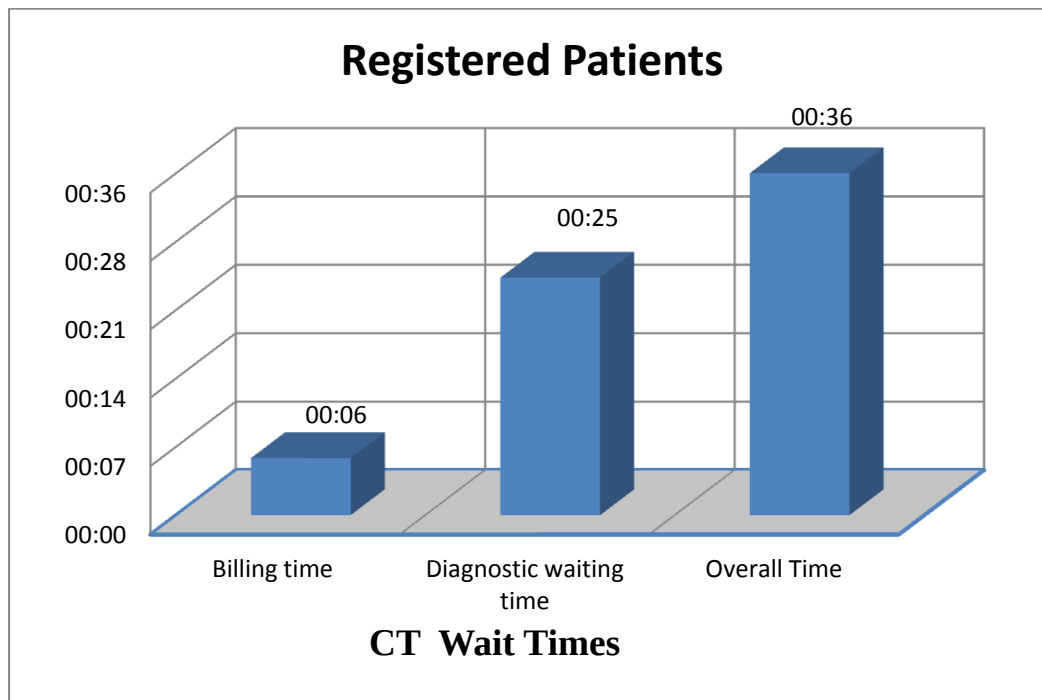


The above table and graph depicts the wait times for CT patients after segregating on the basis of whether they are registered or not.

- The average wait time at the billing section for the CT patients who are registered previously and those who are not registered is 6 minutes and 16 minutes respectively. The difference in billing time among these two groups are mainly because the unregistered patients have to fill in the registration forms and hand it over to the PCS staff who then have to register these patients in the HIS.
- The average wait time at the Diagnostic section outside the CT room for patients who are registered previously and those who are not registered is 25 minutes and 34 minutes respectively. The difference here is mainly because most of the pre-registered patients are aware of the appointment system and come after taking prior appointments.
- The average time (Overall Time) for the patient from when he/she enters the billing section to the test being done for the CT patients who are registered previously and those who are not registered is 36 minutes and 1 hour and 21 minutes respectively.

Table 2.2: Wait Times for CT (Registered Patients)

CT	Billing Time	Diagnostic Waiting	Overall Time
Registered	00:06	00:25	00:36

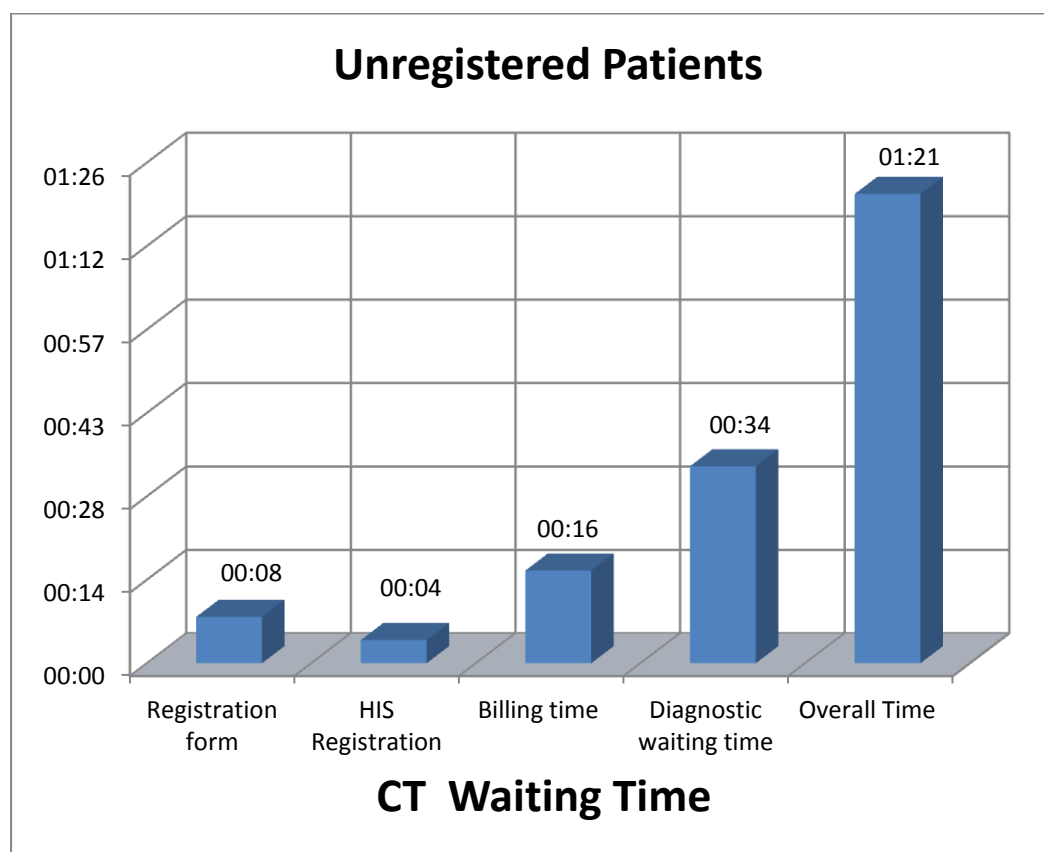


The table and graph above shows the wait times for CT patients who are registered with the system before.

- The average billing time here is 6 minutes.
- The average Diagnostic waiting time is 25 minutes.
- The overall time from when the patient enters the diagnostic billing section to when he/she enters the CT room to get the study done is 36 minutes.

Table 2.3: Wait Times for CT (Unregistered Patients)

CT	Registration form	HIS Registration	Billing time	Diagnostic waiting time	Overall Time
Unregistered	00:08	00:04	00:16	00:34	01:21

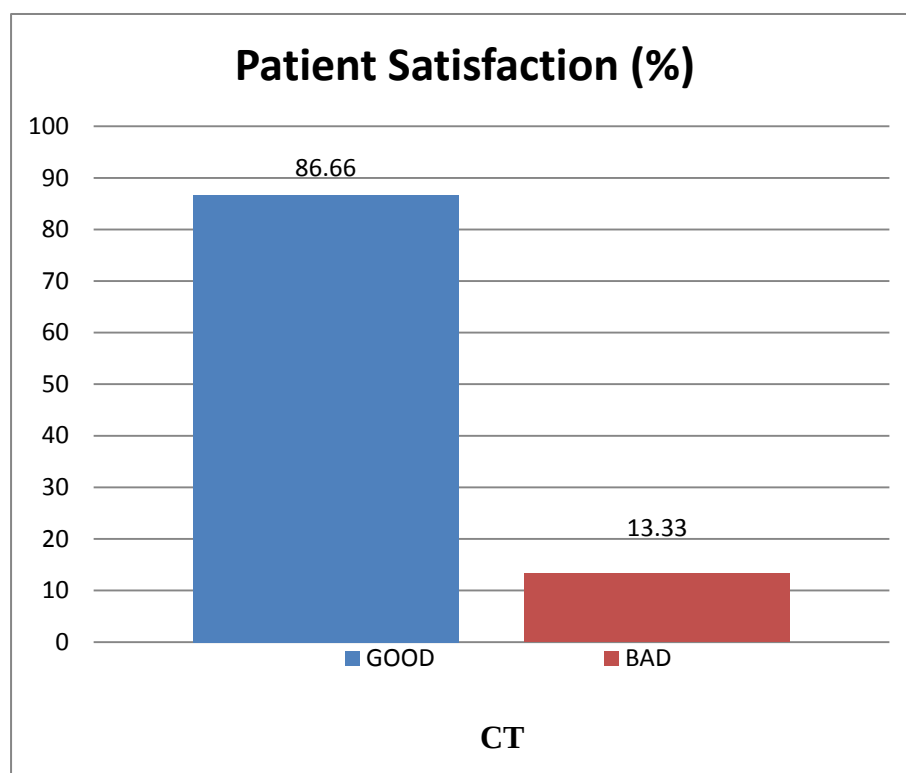


The above table and graph shows the wait times for CT patients who were not registered before with the HIS.

- The average time for the patient filling up the registration form and then handing it back to the PCS staff is 8 minutes.
- The average time for the PCS staff entering the patient details into the HIS as well as making the billing invoice is 4 minutes.
- Hence the total billing waiting time comes to about 16 minutes for unregistered patients.
- The average diagnostic waiting time comes to 34 minutes.
- The overall time the patient has been waiting since he/she entered the billing section to the test being done is 1 hour and 21 minutes for unregistered patients.

Table 2.4: Patients' satisfaction with CT

Patient Satisfaction	GOOD	BAD
Percentage (%)	86.66	13.33

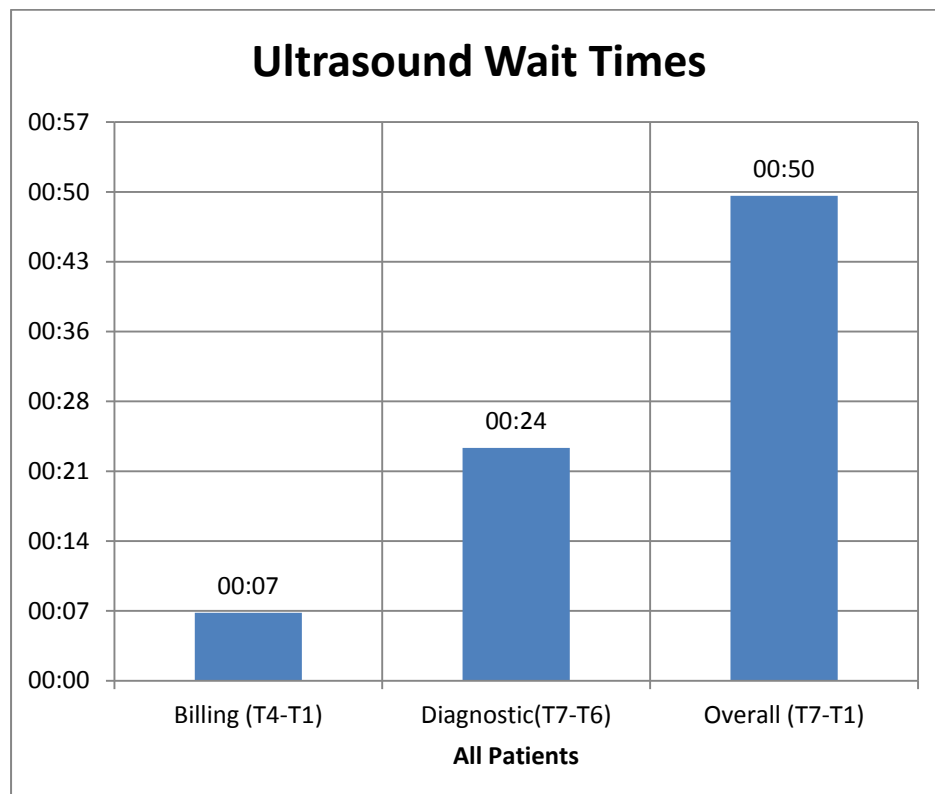


The above table and graph shows the patients satisfaction with the CT department.

- Out of the total patients observed only 2 (13.3%) of the patients were not satisfied with their experience with the Diagnostic (CT) department.
- This was mainly because of the increased waiting outside the CT room which was mainly for the non appointment patients again.

Table 3.0: Ultrasound Wait Times for all Patients

Test	Billing (T4-T1)	Diagnostic(T7-T6)	Overall (T7-T1)
Ultrasound	00:07	00:24	00:50



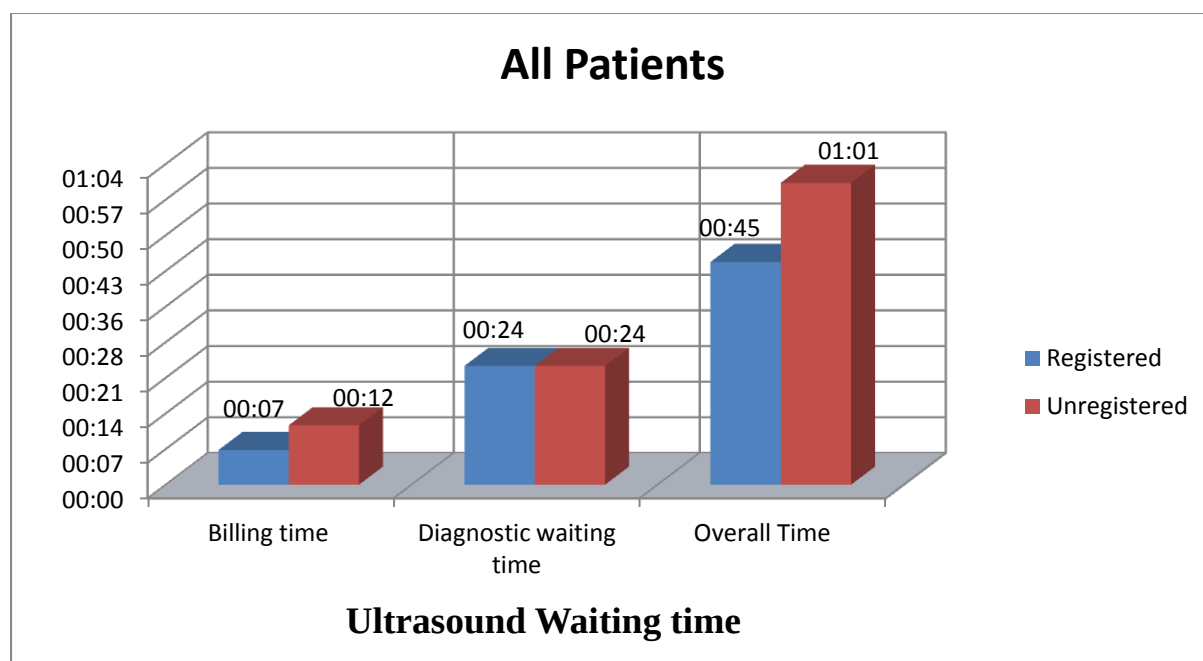
The above table and graph depicts the wait times for all patients of Ultrasound.

- The average wait time at the billing section for the Ultrasound patients is 7 minutes.
- The average wait time at the Diagnostic section outside the Ultrasound room is 24 minutes.
- The average time (Overall Time) for the patient from when he/she enters the billing section to the test being done is 50 minutes.

Here, it is observed that as the appointments are already given out, so especially the new patients have to usually wait till a slot is vacant to get the study done.

Table 3.1: Wait Times for Ultrasound (Registered and Unregistered Patients)

Ultrasound	Billing time	Diagnostic time	waiting	Overall Time
Registered	00:07	00:24		00:45
Unregistered	00:12	00:24		01:01

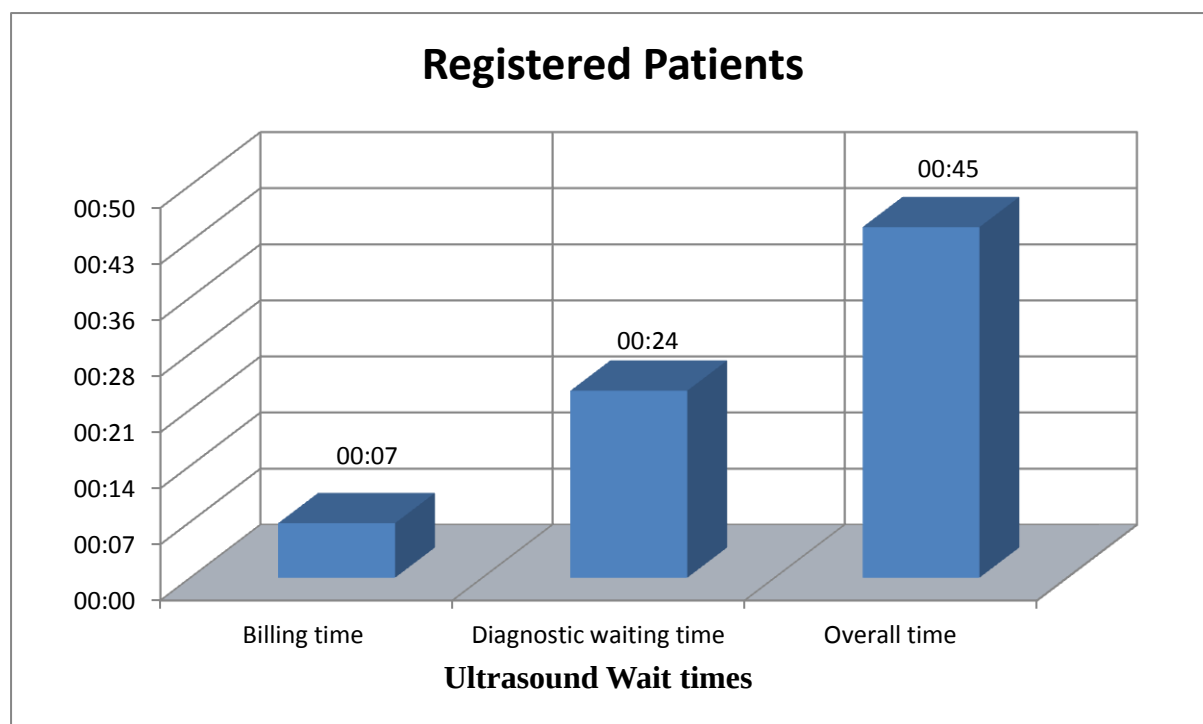


The above table and graph depicts the wait times for Ultrasound patients after segregating on the basis of whether they are registered or not.

- The average wait time at the billing section for the Ultrasound patients who are registered previously and those who are not registered is 7 minutes and 12 minutes respectively. The difference in billing time among these two groups are mainly because the unregistered patients have to fill in the registration forms and hand it over to the PCS staff who then have to register these patients in the HIS.
- The average wait time at the Diagnostic section outside the Ultrasound room for patients who are registered previously and those who are not registered is 24 minutes for both.
- The average time (Overall Time) for the patient from when he/she enters the billing section to the test being done for the Ultrasound patients who are registered previously and those who are not registered is 45 minutes and 1 hour and 1 minute respectively.

Table 3.2: Wait Times for Ultrasound (Registered Patients)

Ultrasound	Billing time	Diagnostic waiting time	Overall time
Registered	00:07	00:24	00:45

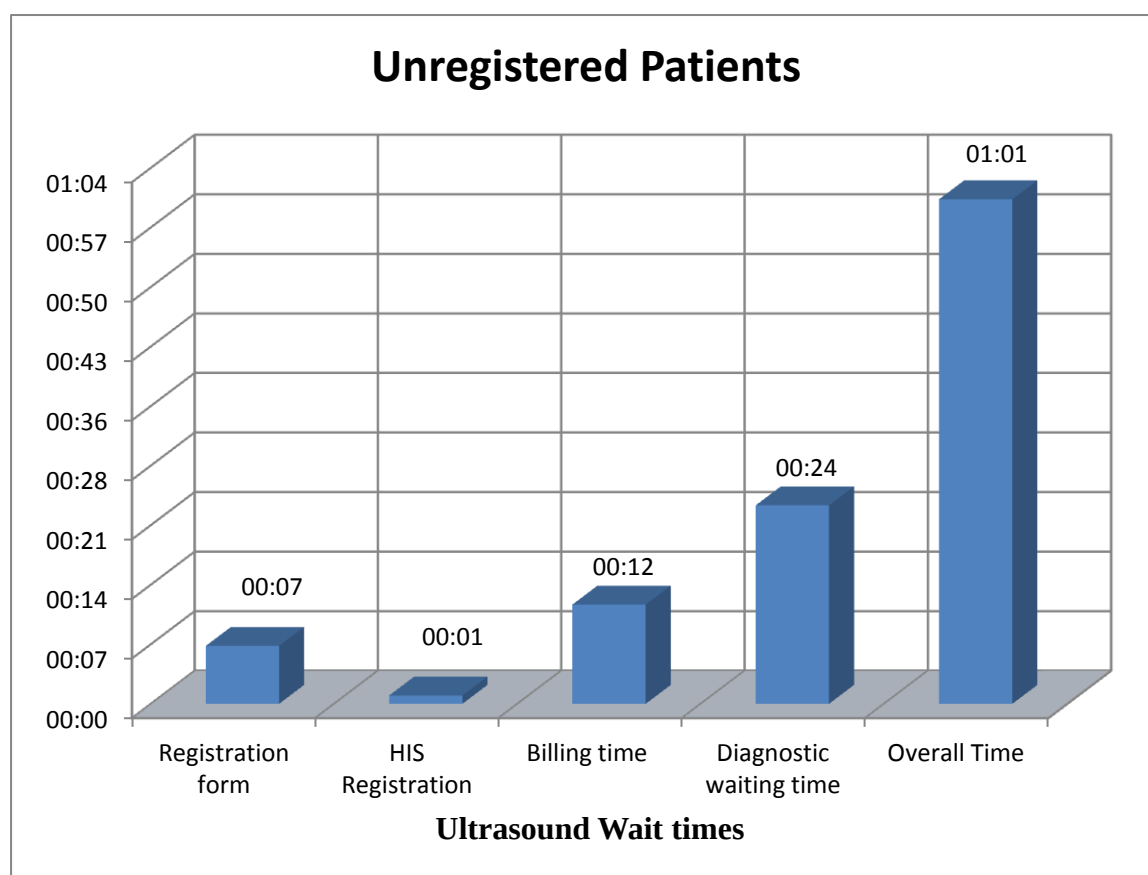


The table and graph above shows the wait times for Ultrasound patients who are registered with the system before.

- The average billing time here is 7 minutes.
- The average Diagnostic waiting time is 24 minutes.
- The overall time from when the patient enters the diagnostic billing section to when he/she enters the Ultrasound room to get the study done is 45 minutes.

Table 3.3: Wait Times for Ultrasound (Registered Patients)

Ultrasound	Registration form	HIS Registration	Billing time	Diagnostic time	Overall Time
Unregistered	00:07	00:01	00:12	00:24	01:01

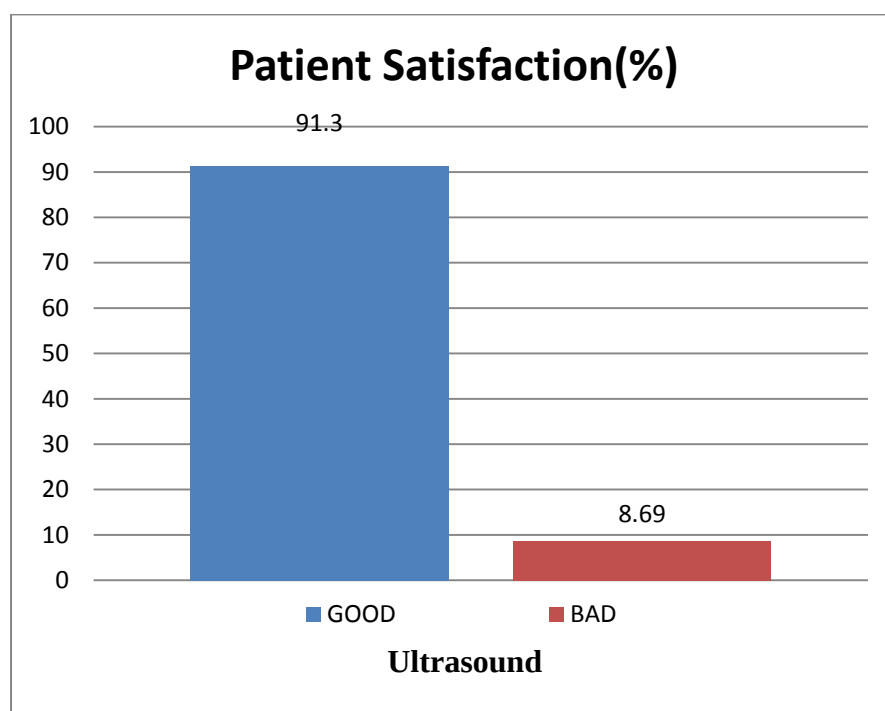


The above table and graph shows the wait times for Ultrasound patients who were not registered before with the HIS.

- The average time for the patient filling up the registration form and then handing it back to the PCS staff is 7 minutes.
- The average time for the PCS staff entering the patient details into the HIS as well as making the billing invoice is 1 minute.
- Hence the total billing waiting time comes to about 12 minutes for unregistered patients.
- The average diagnostic waiting time comes to 24 minutes.
- The overall time the patient has been waiting since he/she entered the billing section to the test being done is 1 hour and 1 minute for unregistered patients.

Table 3.4: Patients' satisfaction with Ultrasound

Patient Satisfaction	GOOD	BAD
Percentage (%)	91.3	8.69

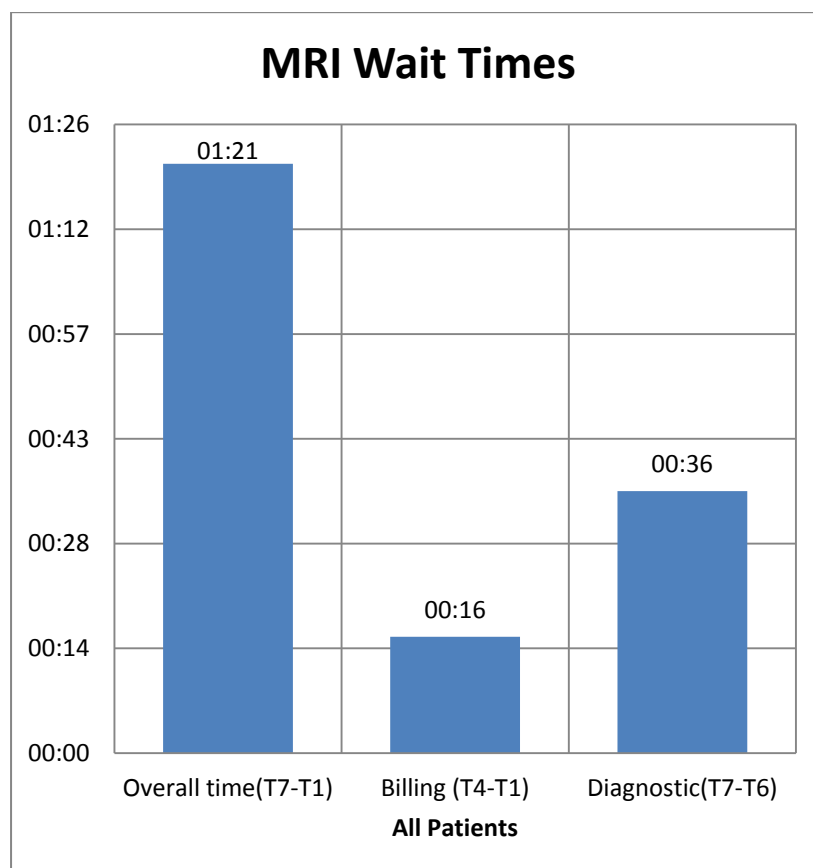


The above table and graph shows the patients satisfaction with the Ultrasound department.

- Out of the total patients observed only 2 (8.69%) of the patients were not satisfied with their experience with the Diagnostic (Ultrasound) department.

Table 4.0: Wait Times for MRI for all patients

Test	Overall time(T7-T1)	Billing (T4-T1)	Diagnostic(T7-T6)
MRI	01:21	00:16	00:36



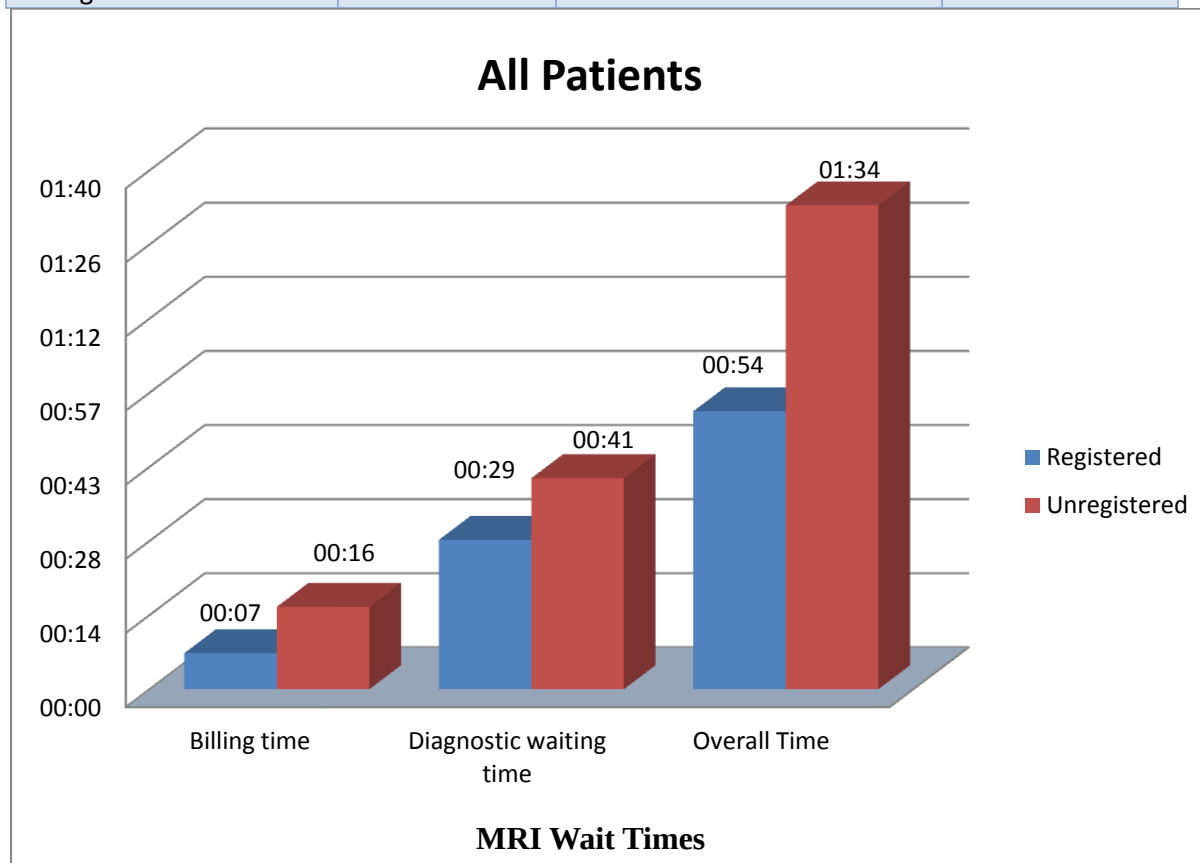
The above table and graph depicts the wait times for all patients of MRI.

- The average wait time at the billing section for the MRI patients is 16 minutes.
- The average wait time at the Diagnostic section outside the MRI room is 36 minutes.
- The average time (Overall Time) for the patient from when he/she enters the billing section to the test being done is 1 hour and 21 minutes.

Here, it is observed that as the appointments are already given out, so especially the new patients have to usually wait till a slot is vacant to get the study done. As also in case of patients from the emergency or from the ICU, these patients are given preference and rightly so over the other cases.

Table 4.1: Wait Times for MRI (Registered and Unregistered patients)

MRI	Billing time	Diagnostic waiting time	Overall Time
Registered	00:07	00:29	00:54
Unregistered	00:16	00:41	01:34

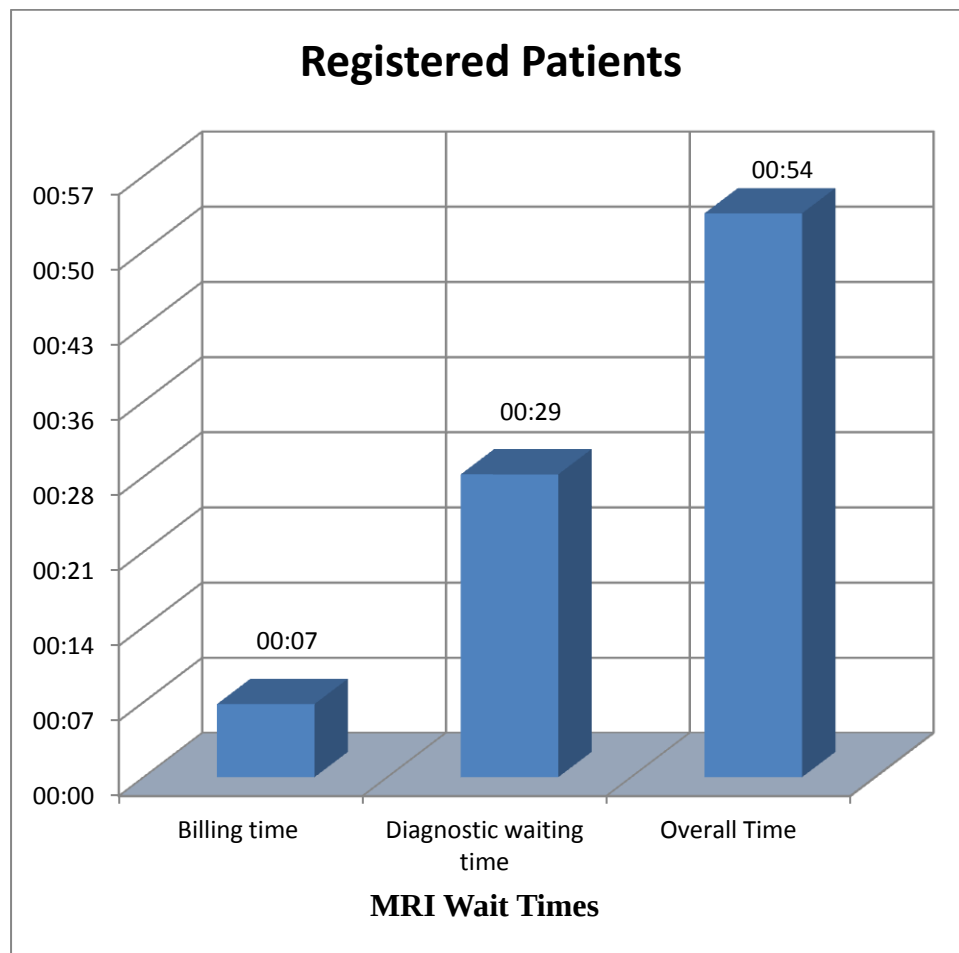


The above table and graph depicts the wait times for MRI patients after segregating on the basis of whether they are registered or not.

- The average wait time at the billing section for the Ultrasound patients who are registered previously and those who are not registered is 7 minutes and 16 minutes respectively. The difference in billing time among these two groups are mainly because the unregistered patients have to fill in the registration forms and hand it over to the PCS staff who then have to register these patients in the HIS.
- The average wait time at the Diagnostic section outside the Ultrasound room for patients who are registered previously and those who are not registered is 29 minutes and 41 minutes respectively..
- The average time (Overall Time) for the patient from when he/she enters the billing section to the test being done for the Ultrasound patients who are registered previously and those who are not registered is 54 minutes and 1 hour and 34 minute respectively. The difference is mainly because in case of unregistered patients, they have not taken appointments and hence the time is only given to them when a slot is vacant.

Table 4.2: Wait Times for MRI (Registered Patients)

MRI	Billing time	Diagnostic waiting time	Overall Time
Registered	00:07	00:29	00:54

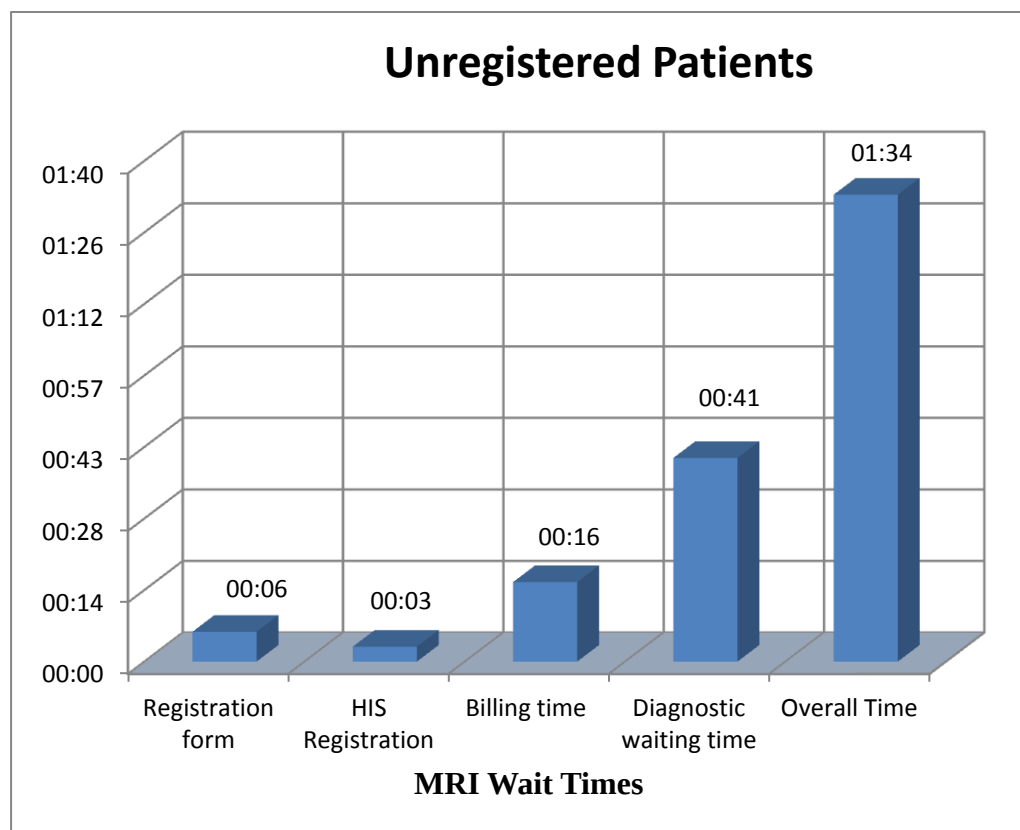


The table and graph above shows the wait times for MRI patients who are registered with the system before.

- The average billing time here is 7 minutes.
- The average Diagnostic waiting time is 29 minutes.
- The overall time from when the patient enters the diagnostic billing section to when he/she enters the CT room to get the study done is 54 minutes.

Table 4.3: Wait Times for MRI (Registered Patients)

MRI	Registration form	HIS Registration	Billing time	Diagnostic time	waiting	Overall Time
Unregistered	00:06	00:03	00:16	00:41		01:34

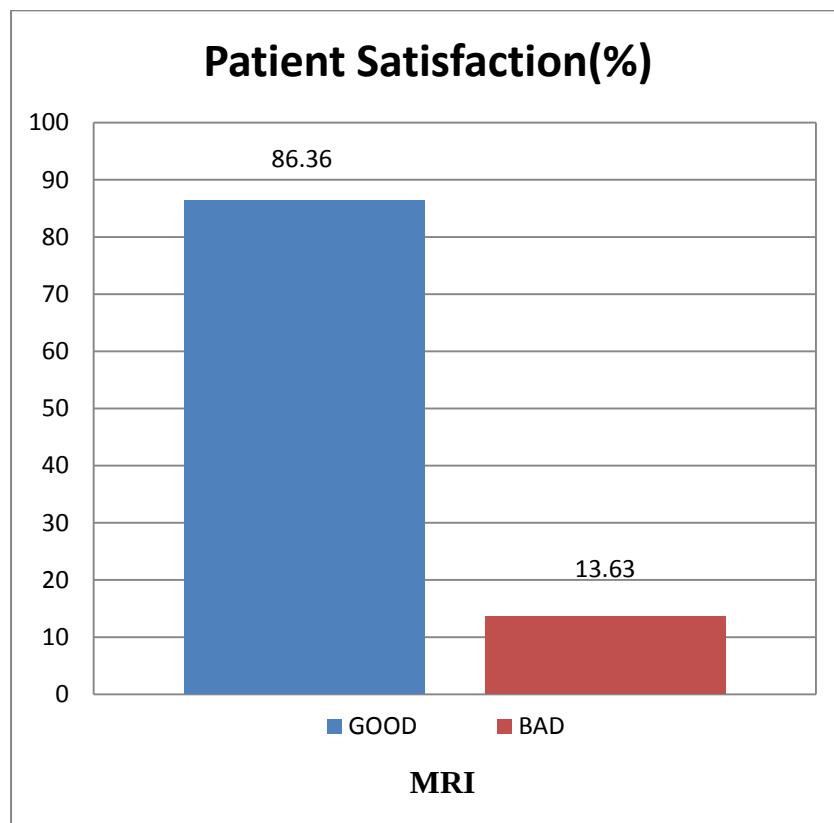


The above table and graph shows the wait times for MRI patients who were not registered before with the HIS.

- The average time for the patient filling up the registration form and then handing it back to the PCS staff is 6 minutes.
- The average time for the PCS staff entering the patient details into the HIS as well as making the billing invoice is 3 minutes.
- Hence the total billing waiting time comes to about 16 minutes for unregistered patients.
- The average diagnostic waiting time comes to 41 minutes.
- The overall time the patient has been waiting since he/she entered the billing section to the test being done is 1 hour and 34 minutes for unregistered patients.

Table 4.4: Patients' satisfaction with MRI

Patient Satisfaction	GOOD	BAD
Percentage (%)	86.36	13.63

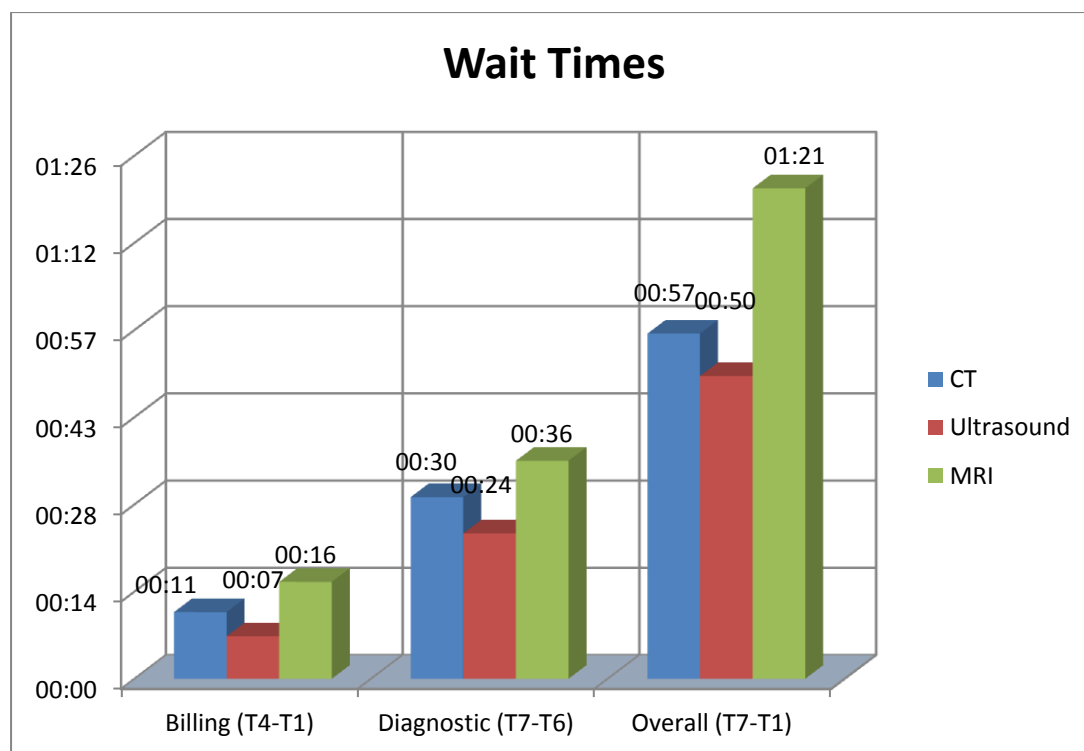


The above table and graph shows the patients satisfaction with the MRI department.

- Out of the total patients observed only 2 (13.63%) of the patients were not satisfied with their experience with the Diagnostic (MRI) department.
- This was mainly because of the increased waiting outside the MRI room which was mainly for the non appointment patients again.

Table 5.0: Wait Times for all patients for the 3 Modalities (CT, Ultrasound and MRI)

Test	CT	Ultrasound	MRI
Billing (T4-T1)	00:11	00:07	00:16
Diagnostic (T7-T6)	00:30	00:24	00:36
Overall (T7-T1)	00:57	00:50	01:21



The above table and graph shows the Wait times for all patients for the 3 modalities (CT, Ultrasound and MRI).

- Here it is observed that among the wait times, the longest occurs in MRI followed by CT and then Ultrasound. This probably can be explained by the fact that usually a MRI test takes the longest to complete and hence accommodating patients in between appointments is harder

Observations:

Factors leading to the increased waiting time:

- 1) Registration form is quite long with a few unnecessary details being asked of the patient and hence takes time to fill
- 2) Registration form in Hindi language is not available and hence patients have problems filling it up in English or they take the help of the PCS staff in filling it and hence this leads to the PCS staff dedicating more time to such particular patients and so delaying the other patients who are in waiting.
- 3) There is a language problem with the international patients sometimes with the translator not being present in the rush hour.
- 4) HIS is slow and complicated (because of the newer version and inadequate training). There are a few troubleshooting problems occurring occasionally which would lead to the IT technician being called.
- 5) Another problem with the HIS is the limited number of appointments that can be made in the system which varies for MRI, CT and ultrasound.
- 6) The patients with TPA have to have their photo ID scanned and saved in the system which may hinder the other patients waiting in the queue.
- 7) Sometimes patients have to wait in spite of taking appointment because the billing takes longer as there is no segregation for appointment and non appointment patients.
- 8) Multitasking by a single PCS staff was there like appointment, queries, and report collection and sometimes the PCS staff being busy with a phone call.
- 9) Patients have queries that used to be cleared by the PCS staff and sometimes the staff has to call a doctor for any doubts to be cleared.
- 10) Sometimes appointment patients don't come on time leading to other patients being delayed.
- 11) No proper Queue is maintained as the billing counter is in the shape of an arc and hence invariably patients stand right beside each other around the whole counter leading to a commotion on certain occasions.
- 12) Some patients come to the billing counter and then while they do the billing, call up the respective doctors confirming about the exact test to be done
- 13) High rush in the OPD especially on Mondays and Saturdays and hence there is a shortage of GDA's.

Recommendations:

- 1) Better communication skills among the PCS staff and their training, especially to handle difficult patients. A proper soft skills and communications training need to be given on a regular basis.
- 2) Training of the PCS staff to handle the international patients especially, may be, by giving them basic Arabic knowledge as in terms of greeting the patients as this would add on to the patient experience with Artemis.
- 3) There should be a provision made such that the appointments and the registration of the patients can be made online by just going to the Artemis website, which would definitely cut down on a lot of time wasted in the waiting area for the patients.
- 4) HIS should be simplified and made compatible with the processes of the diagnostic system.
- 5) One noticed issue is that most computers in the billing as well as the radiology department have different times set on them. This would have to be rectified with standard time set on each one of them.
- 6) A small map indicating all sub departments in the radiology section should be put up at the billing section or near the waiting/seating area so to facilitate the patients moving from the billing section to the radiology section. Or even the invoices on the back side could have the map indicating all the departments in the radiology.
- 7) The registration forms should be altered with only information that is absolutely necessary at the time of registration to be asked and so making it shorter and requiring lesser time to fill.
- 8) There should be registration forms available in Hindi.
- 9) There should be proper segregation for the billing section and for the report collection section and also have a separate section for the appointment patients. All these should be segregated and queue barriers should be placed making it more organised and streamlined.
- 10) A Queue management system should be installed at the section to aid the billing staff.
- 11) Brainstorming should be done with the PCS staff to improve the waiting time.
- 12) There should be adequate replacement of staff if anyone's on leave.
- 13) Report times should be less, as this directly causes delay in patient getting the treatment.

Limitations of the study:

- 1) The study is restricted to only the Imaging department and included only the CT, MRI and Ultrasonography only.
- 2) Small sample size.
- 3) The study was conducted only during the time of morning and afternoon, not in the night and not the odd hours.
- 4) Only OPD patients were taken whereas IPD and emergency patients were not included, as this was one of the causes of delay. Since, emergency and ICU patients were given preference in between the appointed slots; hence causing the delay to the OPD patients, which was unavoidable.

Conclusion

This study was done in the radiology section of the Diagnostic Department and during the study, the whole process of the billing as well as patient movement across different parts of the diagnostic department were tracked by the researcher. Through my experience, I learned about the workflow in the Diagnostic Department as well as what each sub department such as the MRI, CT and the ultrasound entails in terms of the standard operating protocols, quality standards as well the daily work procedures of the radiology technicians. Through the doctors and the technicians, I have obtained a basic understanding of the management issues that is faced by them in terms of the workflow issues, issues with the HIS and different demands placed on the Radiology Department especially from the Emergency, ICU and Inpatient Departments and how they go about fitting each patient in their schedule as well as interdepartmental coordination that is an absolute necessity if a hospital is to function efficiently.

The PCS staffs that take care of the whole Billing and report collection part of the department are very well organised. Through them I have learned that patient is paramount. The patients come into the hospital expecting the services to be of very high standards and it is their right that they get them. Yes, not always we can satisfy the patients, but we still have to go out of our way in an effort to do so. The PCS staffs are the first contact of a patient in the hospital and a negative experience here would definitely increase the probability that the patient would not come to Artemis again. The PCS staff usually tackle issues like staff shortage, difficult patients, issues with HIS but all this is handled very professionally by the staff following the Artemis' policy of 'Service with a Smile'.

The nature of the hospital work is such that there is less tolerance of errors and great concern for clarity and responsibility. The cost of error or mistake in hospital is very high involving life and death as well as the legal implications. Hospital work is interdependent. The hospital employees come from different education and class background. Hospital requires close contact and frequent interaction within the organisation. Therefore, inter cadre relationships have to be very effective for carrying out the objective of the Hospital. Resources, time, expectations and demands of the community for patient satisfaction are high. All these distinguished characteristics require professionalism in hospital management for better performance which is very evident in the way Artemis is being managed.

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